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OPERATIVE AND RADIOLOGICAL TREATMENT OF MALIGNANT TUMOURS OF THE MOUTH

by

Elis Berven

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In the following paper I have given tabulated accounts of 323 cases of cancer treated at Radiumhemmet during the last two decades, the cases including cancer of the tongue, sublingual region, mandible, cheek and tonsils as well as sarcoma of the tongue and tonsils. Tumours of the alveolar processes of the upper jaw and the hard palate have not been included, belonging as they do, clinically and therapeutically, to

maxillary tumours and being, at any rate, difficult to differentiate from these. The majority of these collected cases have either been sent directly to Radiumhemmet for radiological treatment or else been operated upon in the various hospitals and subsequently sent to Radiumhemmet for post-operative, prophylactic treatment or for treatment of recurrences. The treatment has always been undertaken in close contact with the doctor who sent the patient. I have myself examined and personally directed the treatment of all the patients with the exception of a few cases from the years prior to 1913.

The rapid development, to which the technique of roentgen as well as radium therapy has been subjected during the period of time to which this account refers, has caused the different forms of treatment to undergo considerable variations. The means of treatment have not exclusively been radium and roentgen but electro-endothermy has, inter alia, been extensively in use since 1921.

The systematic organisation elaborated at Radiumhemmet for checking the results of treatment has enabled us to follow up all the cases received for treatment; these have also been included in the statistics.

Besides giving an account — up to 1926 — of the results from purely radiological treatment as well as from combined surgical-radiological forms of treatment, I have also touched upon one or two important details pertaining to the treatment of tumours, namely the question of the origin of glandular metastases, their importance for the prognosis and treatment and the danger of incomplete operations of tumours.

In regard to the tumours of the mouth my account of these cases is a continuation of FORSSELL's work »Översikt över resultaten av svulstbehandling vid Radiumhemmet 1910—1911»[1] and »Översikt över resultaten av kräftbehandlingen vid Radiumhemmet i Stockholm 1910—1915».[2] The principles for the treatment have in the main been the same as those outlined by FORSSELL in these works, of such fundamental importance for the radiological therapy.

Cancer of the tongue

Survey of the material

86 cases of cancer of the tongue have been treated at »Radiumhemmet» in the course of the 10- year period, 1916—1925. 69 of these have

[1] (»Survey of the results of the tumour treatment at Radiumhemmet 1910—1911.»)

[2] (»Survey of the results of the cancer treatment at Radiumhemmet in Stockholm 1910—1911.»)

been observed for at least three years and 54 for at least five years and thus allow the arrangement of three and five years statistical data. Most of the patients have been sent to Radiumhemmet from hospital doctors in Sweden, wherefore the clinical diagnosis of cancer has been made in at least two different places. In addition specimens for microscopical verification of the diagnosis have been done in all cases, where possible, without hazarding the prognosis. Microscopical diagnosis is only lacking in three of the 29 cases now living.

A general survey of the material, grouped according to year of admission, will be found in table I, where it has been arranged in four sections (A. B. C. and D.) with regard to condition on admission and treatment obtained.

Table I

Survey of 86 cases of lingual cancer, treated at Radiumhemmst 1916—1925

Clinical section and treatment	Group	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	Total cases
A. Operable. Radiolog. treatm. only	I.		1	111	1				1			6 liv.
			1	7	1	1			1			11
				[1]) 1111		1						5 dead
B. Combined surg. and radiol. treatm.	I.			111		1	11		11111	11	111	16 liv.
		1		3	2	2	2	1	6	5	5	27
		[2]) 1			[3]) 11	[4]) 1		[5]) 1	1	111	11	11 dead
	II.			1								1 liv.
				1			1		1			3
							[6]) 1		1			2 dead
C. Operation. Recurrences. Radiol. treatm.	I.		1	1	1						1	4 liv.
			1	3	2		1			1	1	9
				11	1		1			1		5 dead
	II.											0 liv.
		1		3			1				1	6
		1		111			[7]) 1				1	6 dead
D. Inoperable. Radiol. treatm. only	I.						1				1	2 liv.
			1		2	1	2	1	1		1	9
			1		11	1	1	1	1			7 dead
	II.											0 liv.
		1	5	2	1	1	4	3	1	1	2	21
		1	11111	11	1	1	1111	111	1	1	11	21 dead
			2	8	2	1	3		6	2	5	29 liv.
	Total	3	8	19	8	5	11	5	10	7	10	86
		3	6	11	6	4	8	5	4	5	5	57 dead

[1]) Dead free from symptoms in cerebral haemorrhage after 8 years. — [2]) Dead, free from symptoms, after 2 years in pneumonia. — [4]) Free from symptoms for 3 years, then glandular recurrence and death. — [4]) Free from symptoms for 4 1/2 years, then glandular recurrence and death. — [5]) Free from symptoms for 1 year, then glandular recurrence and death. — [6]) Free from symptoms for 4 years, then glandular recurrence and death. — [7]) Free from symptoms for 2 1/2 years, then glandular recurrence and death.

Each of these sections has been divided into two groups according to the presence or not of glandular metastases. Group I thus comprises cases where no clinically demonstrable metastases could be found at the operation or on admission to Radiumhemmet. Group II is made up of those cases where there was definite clinical evidence of glandular metastases.

The fat figures in the table denote the number of patients. The figures at the upper right hand of the fat ones denote those patients *who were alive and free from symptoms on Jan. 1, 1927* and those on the lower left hand side patients *who had died by that date, either free*

Table II

Survey of therapeutic result of 86 cases of lingual cancer after 1, 3 & 5 years

Clinical section and treatment	Group	Cases 1916—1925		Cases 1916—1923		Cases 1916—1921	
		Number of cases	Free from sympt. 1 year or more	Number of cases	Free from sympt. 3 years or more	Number of cases	Free from sympt. 5 years or more
A. Operable. Radiol. treatm. only	I	11	7 (64 %)	11	7 (64 %)	10	6 (60 %)
B. Combined surg. and radiol. treatm.	I	27	20 (74 %)	17	13 (77 %)	10	6 (60 %)
	II	3	2 (67 %)	3	2 (67 %)	2	1 (50 %)
	I+II	30	22 (73 %)	20	15 (75 %)	12	7 (58 %)
C. Operation. Recurrences. Radiol. treatm.	I	9	4 (44 %)	7	3 (43 %)	7	3 (43 %)
	II	6	0 (0 %)	5	0 (0 %)	5	0 (0 %)
	I+II	15	4 (27 %)	12	3 (25 %)	12	3 (25 %)
D. Inoperable. Radiol. treatm. only	I	9	2 (22 %)	8	1 (12 %)	6	1 (16 %)
	II	21	0 (0 %)	18	0 (0 %)	14	0 (0 %)
	I+II	30	2 (7 %)	26	1 (4 %)	20	1 (5 %)
A—D. The whole material	I	56	33 (59 %)	43	24 (56 %)	33	16 (49 %)
	II	30	2 (7 %)	26	2 (8 %)	21	1 (5 %)
	I+II	86	35 (41 %)	69	26 (38 %)	54	17 (32 %)
A—C. Operable cases and those operated upon, proph. treated and recurrences	I+II	56	33 (59 %)	43	25 (58 %)	34	16 (47 %)
A—B. Operable cases and those operated upon, proph. treated.	I+II	41	29 (71 %)	31	22 (71 %)	22	13 (59 %)

from cancerous symptoms in intercurrent disease or in cancer. Patients being free from symptoms after three or five years respectively have been included as free from symptoms for this length of time in table II, even if later dead in cancer. Where the figure is underlined it means that the diagnosis has been verified by microscopical examination. This form of tabulation enables a complete survey to be obtained of the quantity as well as the quality of the material.

In table II we find a survey of the results of treatment after the cases have been under observation for at least one, three and five years. The results have been given for each of the four sections (A. B., C. and D.) in which the material has been grouped (see page 476) as well as for the whole material in total. The latter figure cannot, naturally, be used for comparison with results at other clinics, as the nature of the material in regard to operability and occurrence of glandular metastases greatly varies and the prognosis depends upon these factors. The table nevertheless gives a certain idea of the prognosis with the present technique of treatment.

To enable a comparison to be made with the results obtained by surgical treatment only I have submitted the results of treatment of operable cases treated radiologically only and of operated cases treated after operation as well as the recurrences. As the recurrences with their worse prognosis for radiological treatment reduce the percentage of cures I have also stated the number of cures among the operable cases only, radiologically treated and operated cases, prophylactically treated; this figure is probably nearest comparable with the results of purely surgical treatment.

This table pertaining to the results has been detailed to the extent shown in order to avoid too much space to be taken up by discussion in the text.

Section A. Operable cases. Radiological treatment only

This section comprises 11 well operable cases which on admission showed no glandular metastases clinically demonstrable. The tumours have been relatively small, up to the size of hazel-nuts, clearly limited, most of them with superficial ulcerations, located to the forepart of the tongue, in front of papillae vallatae at the edge of or on the upper surface of the tongue. The patients have come for treatment after a relatively brief duration of the disease, about two to four months.

All these cases have only had radiological treatment with contact application of radium tubes, fixed by means of plastic mass to the surface of the tumour. In addition to this, preventative roentgen treatment has systematically been given in several series over the glandular regions.

The therapeutic results will be clear from table II.

Since 1920 these early cases of lingual cancer have been treated with electro-endothermy in combination with post-operative local radium treatment instead of radium only, from reasons which will be stated more in detail when dealing with the treatment of buccal cancer, page 499.

Section B. Combined surgical and radiological treatment

This section comprises cases treated with combined surgical and radiological methods. 27 of these patients have been quite operable with limited tumours, the size of up to hazel-nuts, superficially ulcerating, without any glandular metastases clinically demonstrable, while in three cases there were definite metastases. In most cases the tumours have been localised to the fore-part of the tongue.

The primary tumour has been excised by ordinary knife, knife-electrode or by electro-endothermy and the aim of the radiological treatment has mainly been to prevent recurrences by pre- or post-operative applications. The patients have generally been sent to Radiumhemmet in immediate connexion with the operation and on their admission here there have been neither local nor any glandular recurrences. The radiological treatment has consisted of local contact application of radium tubes against the operative area on the tongue, excepting a few cases with small limited tumours removed by electro-endothermy. Besides this all cases have had roentgen treatment over the glandular regions.

Three patients had clearly developed glandular metastases at the time of operation (microscopic diagnosis). Group II.

One of these cases was a man, aged 52, operated upon in 1918 by EINAR KEY for an extensive cancer; half the tongue was removed and the glandular area on the same side cleared and roentgen treatment subsequently given in several series. He is still alive free from symptoms. The second case was a woman, aged 51, who in 1921 had an extensive cancer of the tongue behind papillae vallatae, involving the tonsillar region and the wall of the pharynx and with metastatic formations. After a preoperative roentgen treatment, limiting the tumour, an extensive resection was carried out, involving two-thirds of the tongue and the lateral wall of the pharynx as well as clearing out of the glandular region on the same side, the operation being performed by SAMUEL HYBBINETTE. After post-operative radiological treatment, consisting of local application of radium in the wound cavity as well as a systematic roentgen treatment in several series the patient lived free from symptoms for four years; she then developed recurrences in the glands situated right in the middle of the operated area of trigonum caroticum, that had also been treated with radium and roentgen; the tumour was fixed to the carotid artery and ended her life. The third patient died in connexion with electro-coagulation of the glandular region.

Section C. Operation. Recurrences. Radiological treatment

This section comprises those cases operated upon by the ordinary knife and who only after recurrence after longer or shorter time, locally or in glandular regions, have been sent to Radiumhemmet for treatment of these recurrences, already then manifest.

In regard to the time of appearance of the recurrences two different groups may be recognised. The first group comprises eight patients, where the recurrence arose almost in immediate connexion with the operation, within six weeks after this. In these cases the operation had probably been incomplete. In the remaining seven cases the recurrences only arose after $^3/_4$ year and in one case only $2^1/_2$ years after the operation.

Among the nine cases in group I five only had local recurrences, two had local recurrences in addition to glandular metastases arisen after the operation and two had no local recurrences but obvious glandular metastases.

Of the six patients in group II, in whom the glandular area had also been cleared out in connexion with the operation, all developed recurrences in the glands and three of them also locally.

The four patients rendered free from symptoms by the radium treatment had only local recurrences, while all those with glandular recurrences died.

All these patients have had local radium treatment and in addition several series of systematic roentgen treatment over the glandular regions.

The prognosis after radiological treatment, therefore, is very much worse in recurrences after operation than in cases of primary tumours solely treated radiologically. This is probably, at least partly, explained by the poor conditions of nutrition and absorption existing in the recurrent area, rendering the reactionary possibilities worse with the radium treatment.

Section D. Inoperable cases. Radiological treatment only

Nine patients belonging to this section presented on admission extensive tumours, most of them situated behind papillae vallatae, but no definite clinical glandular metastases. The tumours had developed in a short time, were at least the size of walnuts, and often diffusely limited and with deep ulcerations.

These patients have been treated, partly by local surface application of radium and in a few cases by intubation of radium needles, partly by roentgen over the glandular areas. Of these cases, which experience, so far gained, shows to be hopeless from the start, two are alive at present.

One of them was a man, aged 61, who for the last four weeks had had pains in the tongue and great difficulties in swallowing. On admission in August 1921 his general condition was bad with beginning cachexia and marked difficulties in swallowing. The tumour involved the whole base of the tongue and was extensively ulcerated right down to the epiglottis. Test-excision showed it to be, not a cancroid but a medullary cancer. Patient was given external roentgen treatment in large doses; very severe reactionary troubles supervened, but he gradually recuperated and has been free from symptoms ever since. The second case was that of a man, aged 52, who had had symptoms for three months. Was admitted to Radiumhemmet in March 1925 after having had symptoms for three months. The posterior right portion of the tongue, the palatal fauces and part of the soft palate were involved in a diffusely infiltrated tumour, deeply ulcerated. The patient was given surface applications by radium and external roentgen treatment and now in March 1927 he has been free from symptoms for two years.

In this group there are still another two patients who were rendered free from local symptoms for eight months by radium treatment but who subsequently died from metastases. In all the patients who died metastases arose two—three months after the beginning of treatment.

21 patients had glandular metastases on admission, in some cases of very extensive nature. Most of these patients were in a very bad general condition, where scarcely any general or local power of reaction could be expected to remain. 19 of them also died within the course of 2—6 months after admission.

In these cases we have generally restricted the treatment to one of palliative nature. By this treatment with careful doses a considerable improvement of the subjective troubles of the patient may still be attained, absorption of inflammatory oedematous collections causing a reduction in the size of the tumour. The disintegrating necrotic ulcers often become cleaner with diminution of the secretion. It is important in these cases not to subject the patient to any strong radiological treatment, as the reactionary pains thereby arisen only add to the patient's misery. It is only when a test treatment shows the tumour to be radio-sensitive that it is advisable to try a curative radiological treatment.

Survey of results

The 1-, 3- and 5-years recovery in operable cases treated radiologically only and by combined surgical and radiological methods, shows a recovery percentage of 59 %, 58 % and 47 %. If excluding those cases where recurrences were present on admission, the recovery percentage amounts to 71 %, 71 % and 59 %. The Mayo Clinic which has recorded the best surgical results, has attained 3- and 5-years recovery in 45 % and 38 % in cases free from glandular metastases at the operation and in 17 % and 10 % where such metastases were present. In his statistics from the Swedish Hospitals, 1916—1921, HÄGGSTRÖM found 5 years

recovery in 41 % in cases without metastases and in 13 % in cases with metastases at the operation.

The figures pertaining to the results indicate, that the results of surgical treatment can certainly be considerably improved by employing, in immediate connexion with operation, pre- and post-operative radiological treatment.

The influence of the point of origin of the primary tumour on the tongue upon the course of disease

In the aforesaid I have divided lingual cancer into two groups according to the presence or no of glandular metastases at the commencement of treatment, which of course has a predominant bearing upon the prognosis. The prognosis can also be judged from the point of view of origin of the tumour. Some statistics have also been built up on this ground, e. g. that of REGAUD. In so doing the tongue may be divided into two portions, one anterior and one posterior with the dividing line at the papillae vallatae or through a frontal plane through the 7th tooth in the lower jaw (DELBET).

Cancer in the fore-part of the tongue is noticed by the patient at a very early stage. It is relatively easy to diagnose and easy to operate upon by direct incision without having to open up any new operative routes. In the posterior parts, on the other hand, it is more difficult to be seen both by the doctor and the patient, especially when located on the base of the tongue. It also comes to be diagnosed relatively late and is much more difficult to get at, necessitating extensive operations with a mortality of 35—40 %. On account of the relatively late diagnosis, the rapid progression on to adjacent parts of the pharynx and finally the direct communication through wide lymphatic channels with all the glandular regions of the neck, we also do find metastases arise relatively early. Neither MORESTIN nor SEBILEAU, who both have a great experience of this subject, have been able to record a single case of definite recovery from cancer of the posterior parts of the tongue.

In table III will be found a survey of the results of treatment at Radiumhemmet from the point of view of origin of the cancer in the tongue. It is clearly demonstrated in the table how the prognosis differs in cases where the tumour is situated in the fore-part of the tongue and where it is located to the posterior parts, only 18 % of the latter being rendered free from symptoms against 47 % of the former. With regard to the frequency of the two forms the anterior tumour seems to be somewhat more usual.

The cause of the bad prognosis in cancer of the posterior parts of the tongue is in all probability to be found less in the location and con-

Table III

Survey of the result with reference to the point of origin of the tumour on the tongue

Clinical section and treatment	Anterior part of the tongue			Posterior part of the tongue		
	Number of cases	Now living	Dead	Number of cases	Now living	Dead
A. Operable. Radiol. treatment only	11	6	5	—	—	—
B. Combined surg. and radiol. treatment	23	12	11	7	5	2
C. Operation. Recurrences. Radiol. treatment	10	4	6	5	0	5
D. Inoperable. Radiol. treatment only	3	0	3	27	2	25
Total	47 (55 %)	22 (47 %)	25	39 (45 %)	7 (18 %)	32

sequent extension to surrounding parts of the pharynx than in the exceedingly early metastatic formations in the lymphatic glands of the neck. For the fact is that cancer of the posterior parts of the tongue forms its metastases very much earlier than that of the fore-part. The metastases frequently come at the same time as or only a few weeks after the patient notices his first symptoms and in most cases the metastases have already on admission reached a size considerably in excess of that of the primary tumour. Of 39 cancerous tumours in the posterior parts of the tongue there were already on admission definite metastases in twenty-five, or 64 %, while in the 47 cases of tumours in the anterior parts only six, or 13 %, had definite metastases.

For the sake of the prognosis, therefore, it is exceedingly important not to waste any time with palliative measures when ulcerations are suspected, especially in the posterior parts of the tongue.

The treatment of the primary tumour

In the treatment of lingual cancer one has to consider, on the one hand, the primary tumour itself and on the other, the glandular regions.

As long as a tumour still remains clinically limited to its original place it can probably, if not too extensive, be definitely removed by local treatment and it is clear from several statistics that by using different methods of treatment permanent freedom of symptoms as regards the primary tumour can be obtained in most cases of a not too extensive lingual cancer, even if some of the patients succumb later to

glandular metastases. One of the most important conditions, therefore, for definite recovery to take place is an early diagnosis in a stage when the primary tumour has not as yet had time to form any metastases.

With regard to the fully operable lingual cancer the results of the treatment of the primary tumour itself seem to be about the same, whether the tumour be excised by an ordinary knife, knife-electrode or by electro-endothermy or whether the treatment be carried out by radium in the form of surface applications, intubation with radium needles or emanation capillaries.

At Radiumhemmet we have mostly made use of surface applications of strongly filtered radium tubes and obtained good results; this mode of treatment, however, claims a minute technique and a very great experience besides being greatly time-consuming. Since 1920, therefore, the radium treatment has been exchanged for electro-endothermy, a method which seems to give equally good results and is simpler in its application. After endothermy of the primary tumour, the operated area should be subjected to post-operative radium treatment by means of intubation of radium needles in order to prevent any possible recurrences. (See further page 499.)

The following results have been obtained from treatment of the primary tumour by this technique:

11 cases have been treated radiologically only with surface application of radium; of these cases nine were rendered locally free from symptoms and in two cases only did the tumour fail to respond to the radium treatment. Of 30 cases, treated by operation — 16 of which by electro-endothermy — and subsequent radiological treatment 29 were rendered locally free from symptoms. Of these 29 cases 11 subsequently died from glandular metastases. With these methods of treatment, therefore, the primary freedom from symptoms is very marked.

In radium treatment of recurrences, arisen after operation, the primary freedom from symptoms is obviously less. Of 10 local recurrences only four became primarily free from symptoms by radium treatment.

In the case of inoperable tumours local freedom of symptoms was only obtained in four cases out of 30.

Quick, who has the greatest experience as regards treatment with radium emanations, states that of 34 operable cases of lingual cancer without metastases he obtained 29 recoveries, or 85 %, lasting three months—three years, by emanation treatment only, and Simpson has obtained primary freedom of symptoms by similar methods in 72 % for one year or more.

In case of the tumour having extended to a degree rendering it with

difficulty operable, the best treatment seems to be a combination of surface application and intubation of radium needles or emanation tubes, perhaps replaced by electro-endothermy immediately followed by intubation of radium needles or emanation tubes.

With regard to the treatment of the glandular metastases the reader is referred to page 518.

Sarcoma of the tongue

Sarcoma of the tongue is a relatively rare form of tumour and no statistical data on its treatment are to be found in the literature. In the material of Radiumhemmet there are seven cases recorded (table IV). Four of these have been small, well limited, operable tumours which, for the sake of the diagnosis, have usually been excised with ordinary knife and subsequently, immediately after microscopical verification of the diagnosis, been given post-operative roentgen treatment. None of these cases have had any metastases and all are alive. Two proved to have metastases at the operation, one of whom died after clearing out of the glandular region; the second one, on whom the glandular area was *not* cleared out, is alive and has been free from symptoms for the last twelve months. The microscopical diagnosis in these cases has been fibrosarcoma, angiofibrosarcoma and lymphosarcoma.

Finally, there is an inoperable case with a large ulcerating sarcoma of the base of the tongue. This did not respond to the radiological treatment and the patient died within the course of a year.

Table IV

Survey of 7 cases of sarcoma of the tongue treated at Radiumhemmet 1913—1925

Clinical section and treatment	Group	1916	1918	1919	1921	1924	1925	Total
Combined surgical and radiol. treatment	I.	1 / 1		1 / 1	1 / 1		1 / 1	4 living / 4 / 0 dead
	II.		1 / 1				1 / 1	1 living / 2 / 1 dead
Inoperable. Radiol. treatment only	I.					1 / 1		0 living / 1 / 1 dead
	Total	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	2 / 2	5 living / 7 / 2 dead

Cancer of the sublingual region

Survey of the material

During 13 years, 1913—1925, altogether 26 cases of cancer of the floor of the mouth have been treated at Radiumhemmet. Of these 11 cases have been under observation for five years or more and 19 for three years or more. In seven cases now living the diagnosis has been microscopically verified.

With regard to the classification of the material and the tabulation of table V and VI, being a survey of the nature of the material and the therapeutic results, the reader is referred to the account of lingual cancer, page 476 and 478.

Section A. Operable cases. Radiological treatment only

This section comprises five operable cases, showing no clinical signs of metastases at the time of admission. Three of these tumours have been relatively small, up to the size of beans, situated in the floor of the mouth near the mid-line without infiltrating the tongue or being fixed to the mandible. One of them had a papillomatous surface, the others showed superficial ulcerations. Two tumours have been of larger size, almost as large as walnuts, with deep ulcerations and with commencing infiltration of the tongue.

The early cases have been treated by surface applications of radium, the more advanced by intubation of radium needles; all have been given external roentgen treatment.

The results of the treatment will be clear from table VI.

Section B. Combined surgical and radiological treatment

In nine patients there were no demonstrable metastases at the time of operation or at the commencement of the radiological treatment; four patients had small tumours, movable towards the tongue and the mandible; the remaining five were more extensive ulcerating tumours with commencing infiltration of the tongue.

Two patients only have been treated with electro-endothermy, one from 1924, alive and free from symptoms, and one from 1925, free from symptoms for a year and a half, then local recurrence. The remaining tumours have been excised by ordinary knife.

The radiological treatment has consisted of local surface applications with radium and roentgen treatment. Two of them have been treated by radium at a distance.

One patient only had glandular metastases at the commencement of the treatment and is still alive and has been free from symptoms for the last four years.

This patient had a papillomatous tumour extending over a large part of the right side of the floor of the mouth. The microscopical diagnosis was made of papilloma but clinically the patient exhibited so characteristic malignant symptoms as to justify treatment of the tumour to be undertaken. He was first given a pre-operative roentgen treatment, after which the glandular region was dissected and the tumour excised by knife-electrode at the same sitting. The microscopical diagnosis of cancer of the primary tumour as well as of the glands was established.

The case shows the difficulty of basing a diagnosis solely on the microscopical appearance of the excised portion of the tumour. It is also necessary to take due regard to the clinical nature of a tumour in judging of its malignancy.

Section C. Operation. Recurrences. Radiological treatment

In this section there are only two cases, both belonging to group I. Both have been operated upon by ordinary knife. The glands were cleared out in one of them but no cancer could be detected in the glands. Both developed rapid recurrences after the operation, one of them immediately afterwards and the other one after three weeks. The case on whom no clearing out was done of the glandular region had metastases also on admission to Radiumhemmet. Both were treated with local radium and external roentgen rays. Both became free from local symptoms. The patient on whom the glandular region had been cleared out remained free from symptoms for a year but then developed recurrences, local as well as in the glands. The other patient died earlier from glandular metastases.

The prognosis in recurrences, therefore, is bad in these cases, like it is in cancer of the tongue.

Section D. Inoperable cases. Radiological treatment only

Three patients had no metastases on admission and six had fully developed clinical metastases. All these nine patients presented extensive tumours, most of them forming a large ulcerated cavity in the sublingual region on one side, encroaching upon the tongue and mandible, with thick infiltrated walls and an offensive slough. It is difficult to decide in this stage whether the tumour has originated from the tongue, mandible or sublingual region and it is only by inquiring carefully into the history that this point can be cleared up.

The duration of the disease here, before the patients come for treatment, is obviously prolonged. In the previous sections the patients have come for treatment after the disease having lasted for, on an average, 3—4 months, while in this section it lasted as a rule six months up to a year.

These patients have been given external roentgen treatment as

well as radium at distance and in addition to this local treatment by radium applied to the surface by radium tubes except in one or two cases where the application consisted in intubation of radium needles. One case only was rendered locally free from symptoms for a time of nine months. As for the rest only palliation of brief duration was obtained.

Table V*

Survey of 26 cases of cancer of the sublingual region treated at Radiumhemmet 1913—1925

Clin. section and treatm.	Group	1913	1914	1917	1918	1919	1920	1921	1922	1923	1924	1925	Total
A. Operable. Radiol. treatm. only						1 (1)		1 (1)	1 (1[1])	1 (1)		1 (1)	2 liv. 5 3 dead
B. Combined surg. and radiol. treatm.	I.	1 (1) [2])		1 (1)	1 (1) [3])			1 (1)	1 (1)		2 (1)	2 (1) [4])	4 liv. 9 5 dead
	II.									1 (1)			1 liv. 1 0 dead
C. Operation, Recurr. Radiol. treatm.	I.							1 (1) [5])	1 (1)				0 liv. 2 2 dead
D. Inoperable, Radiol. treatm. only	I.				1 (1)		1 (1)					1 (1)	0 liv. 3 3 dead
	II.		1 (1)		1 (1)				1 (1)	2 (1)	1 (1)		0 liv. 6 6 dead
	Total	0 1 1	0 1 1	1 1 0	0 3 3	1 1 0	0 1 1	2 3 1	1 4 3	1 4 3	1 3 2	0 4 4	7 liv. 26 19 dead

This slight radio-sensibility of the sublingual tumours in a more advanced stage also conforms with the experiences of other radiological clinics. So did SCHREINER among 14 cases of cancer of the floor of the mouth, belonging to group I, get two free from symp-

[1]) Free from symptoms for 2½ years, then local recurrence, electro-coagulation, unaffected and death after still another 2 years. — [2]) Free from symptoms for 2 years, then recurrence which was not treated. — [3]) Free from symptoms for 6 years, death in cancer of the larynx. No signs of cancer locally or in the glands. (Post-mortem report.) — [4]) Free from symptoms for 1½ year, then local recurrence and metastatic glands. — [5]) Free from symptoms for 1 year, then local recurrence and metastatic glands.

* For explanation of table, see p. 476—478.

toms and of 35 cases belonging to group II, five free from symptoms. Of these seven cases four have since developed recurrences, three therefore remaining free from symptoms, having been under observation for, on the most, three years.

Table VI*

Survey of the therapeutical results in 26 cases of cancer of the sublingual region after 1, 3 and 5 years

Clinical section and treatment	Group	Cases 1913—1925		Cases 1913—1923		Cases 1913—1921	
		Number of cases	Free from sympt. 1 year or more	Number of cases	Free from sympt. 3 years or more	Number of cases	Free from sympt. 5 years or more
A. Operable. Radiol. treatm. only	I	5	3 (60 %)	4	2 (50 %)	2	2 (100 %)
B. Combined surg. and radiol. treatm.	I	9	7 (77 %)	5	5 (100 %)	4	3 (75 %)
	II	1	1 (100 %)	1	1 (100 %)	0	0
	I+II	10	8 (80 %)	6	6 (100 %)	4	3 (75 %)
C. Operation. Recurrences. Radiol. treatm.	I	2	1 (50 %)	2	0 (0 %)	1	0 (0 %)
D. Inoperable. Radiol. treatm. only	I	3	0 (0 %)	2	0 (0 %)	2	0 (0 %)
	II	6	0 (0 %)	5	0 (0 %)	2	0 (0 %)
	I+II	9	0 (0 %)	7	0 (0 %)	4	0 (0 %)
A—D. The whole material	I	19	11 (58 %)	13	7 (54 %)	9	5 (56 %)
	II	7	1 (14 %)	6	1 (17 %)	2	0 (0 %)
	I+II	26	12 (46 %)	19	8 (42 %)	11	5 (46 %)
A—C. Operable cases and those operated upon, proph. treated and recurr.	I+II	17	12 (71 %)	12	8 (67 %)	7	5 (71 %)
A—B. Operable cases and those operated upon, proph. treated	I+II	15	11 (73 %)	10	8 (80 %)	6	5 (83 %)

* For explanation of table, see p. 478.

Survey of results

The 1-, 3- and 5-years recovery of operable cases treated radiologically only and by combined surgical and radiological methods shows a recovery percentage of 71 %, 67 % and 71 %. By exclusion

of those cases where recurrences were present on admission the recovery percentage amounts to 73 %, 80 % and 83 %. HÄGGSTRÖM has got three early cases of cancer of the floor of the mouth, two of whom are still alive after five years. KÜTTNER has attained 3-years recovery with operative measures only in 17 %.

The treatment of the primary tumour

With regard to the treatment of the primary tumour the same holds good, on the whole, as for lingual cancer, already described. It would seem as if tumours of smaller size, not yet infiltrating the tongue or mandible, could be treated with like results, whether the extirpation be done with ordinary knife, knife-electrode, electro-endothermy or radium, either in the form of contact application or intubation of needles or emanation tubes. Experience of roentgen treatment shows the same poor results for sublingual cancer as for cancer of the tongue.

At Radiumhemmet we nowadays treat these small sublingual tumours directly with electro-endothermy, as this method seems to be the simplest and the most effective, as well as with such treatment followed by local radium intubation.

In case of larger tumours with a commencing infiltration of tongue or mandible the patient is first given a pre-operative radium treatment at a distance, and after the reaction of this has subsided and the tumour has become limited in extent, electro-endothermy is carried out of the tumorous rests and of infiltrated parts of tongue and mandible, after which patient is given post-operative treatment in several series.

Inoperable tumours are treated with local contact application of radium or intubation as well as radium treatment at a distance from the outside.

With regard to the treatment of the glandular metastases the same holds good as has been stated in the chapter on treatment of metastases.

In sublingual cancer, too, it would seem impossible to obtain any definite improvement by a schematic early dissection of the glandular regions in those cases where no metastases can be clinically demonstrated.

Cancer of the mandibular gum and the mandible

Survey of the material

During 1916—1925 59 cases of cancer of the mandible have been treated at Radiumhemmet. 42 of these have been under observation for at least 3 years and 27 for at least 5 years. Microscopical

verification of the diagnosis is lacking in one of the eight now living. A general survey of the material and therapeutic results will be found in tables VII and VIII which have been arranged on the same principles as those referring to lingual cancer, page 476 and 478.

All cases of the mandible have been tabulated here without regard to whether the cancer has extended primarily from the gum or the mandible. Most of the patients have come for treatment with tumours of so extensive a nature that only a careful inquiry into the history has been able to decide the point of origin of the tumour.

Table VII*

Survey of 59 cases of cancer of the mandibular gum and the mandible treated at Radiumhemmet 1916—1925

Clinical section and treatment	Group	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	Total
A. Operable. Radiol. treatment only	I.	**1** 1				**1** 1	**2** [1]) 1				**1** 1	1 liv 5 4 dead
B. Combined surg. and radiol. treatment	I.					**1** 1	**1** 1	**1** 1	**1** [2]) 1		**4** [3]) 111	3 liv. 8 5 dead
	II.						**2** 1	**2** 1	**3** [4]) 11	**1** 1		3 liv. 8 5 dead
C. Operation. Recurrences. Radiol. treatment	I.	**1** [5]) 1	**1** 1	**3** 111	**1** 1				**1** 1			0 liv. 7 7 dead
	II	**1** 1	**1** 1			**1** 1			**1** 1		**2** 11	0 liv. 6 6 dead
D. Inoperable. Radiol. treatment only	I.			**2** [6]) 11	**3** 111				**3** 11		**4** 1111	1 liv. 12 11 dead
	II.		**1** 1	**1** 1		**2** 11	**1** 1	**2** 11	**1** 1	**5** 11111		0 liv. 13 13 dead
	Total	0 **3** 3	0 **3** 3	0 **6** 6	0 **4** 4	1 **5** 4	2 **6** 4	2 **5** 3	2 **10** 8	0 **6** 6	1 **11** 10	8 liv. **59** 51 dead

[1]) Free from symptoms for more than 3 years, then recurr. progression and death. — [2]) Free from symptoms for 1 year, then recurr. and death. — [3]) Free from symptoms for 1 year, then recurr. and death. — [4]) Free from symptoms for 3½ year, then recurr. and death. — [5]) Temporarily improved for 3 years. — [6]) Free from symptoms for more than 3 years, dead in arteriosclerosis.

* For explanation of table, see p. 476—478.

41 of the tumours seem to have commenced in the gum and only 18 primarily in the mandible.

Section A. Operable cases. Radiological treatment only

To this section I have referred five cases with limited tumours, the size of up to almonds, consisting of superficial ulcerations of the gum, movable towards the mandible except in two cases.

Table VIII*

Survey of the therapeutic results in 59 cases of cancer of the mandibular gum and mandible after 1, 3 and 5 years.

Clinical section and treatment	Group	Cases 1916—1925		Cases 1916—1923		Cases 1916—1921	
		Number of cases	Free from sympt. 1 year or more	Number of cases	Free from sympt. 3 years or more	Number of cases	Free from sympt. 5 years or more
A. Operable. Radiol. treatment only	I	5	2 (40 %)	4	2 (50 %)	4	1 (25 %)
B. Combined surg. and radiol. treatm.	I	8	5 (63 %)	4	2 (50 %)	2	1 (50 %)
	II	8	4 (50 %)	7	3 (43 %)	2	1 (50 %)
	I+II	16	9 (56 %)	11	5 (46 %)	4	2 (50 %)
C. Operation. Recurr. Radiol. treatm.	I	7	0 (0 %)	7	0 (0 %)	6	0 (0 %)
	II	6	0 (0 %)	4	0 (0 %)	3	0 (0 %)
	I+II	13	0 (0 %)	11	0 (0 %)	9	0 (0 %)
D. Inoperable. Radiol. treatm. only	I	12	1 (83 %)	8	1 (13 %)	5	0 (0 %)
	II	13	0 (0 %)	8	0 (0 %)	5	0 (0 %)
	I+II	25	1 (4 %)	16	1 (6 %)	10	0 (0 %)
A—D. The whole material	I	32	8 (25 %)	23	5 (22 %)	17	2 (12 %)
	II	27	4 (15 %)	19	3 (16 %)	10	1 (10 %)
	I+II	59	12 (20 %)	42	8 (19 %)	27	3 (11 %)
A—C. Operable cases and those operated upon, proph. treated and recurr	I+II	34	11 (32 %)	26	7 (27 %)	17	3 (18 %)
A—B. Operable cases and those operated upon, proph treated	I+II	21	11 (52 %)	15	7 (47 %)	8	3 (38 %)

These cases have been treated with contact application of radium against the tumour and roentgen rays for the glandular region.

* For explanation of table, see p. 478.

Section B. Combined surgical and radiological treatment

This group comprises 16 cases; in 12 of them the tumour had extended from the gum and in four from the mandible. In eight cases there were no palpable metastases at the operation. In nine cases the tumour was well limited to the middle and posterior part of the mandible (four in group I and five in group II). In five cases the tumour had encroached upon the greater part of the mandible but was nevertheless localised to this, whereas in two cases the tumour had caused infiltration of the soft parts also.

In eight cases semi-resection of the jaw was performed, in the others only excisions or partial resections. The radiological treatment has consisted of local treatment by radium and external roentgen treatment. It is noteworthy what a large number of cases have been given pre-operative treatment. Of the nine cases, rendered free from symptoms, six were given a systematic pre-operative treatment with roentgen and radium until the tumour had become »filed off»; the operation was then undertaken followed by post-operative treatment.

The satisfactory results may probably partly be ascribed to this systematic pre-operative treatment.

With regard to the results obtained by the combined treatment it should be noted that the same recovery percentage has been obtained in cases with glandular metastases as without, indicating that metastatic formation in cancer of the mandible is of more favourable nature than in other cancers of the mouth. Of the eight patients, belonging to group I, only one had his glands dissected; has since died.

Section C. Operation. Recurrences. Radiological treatment

To this group 13 cases belong, admitted to Radiumhemmet with recurrences clearly developed. Seven of them had local recurrences only, six local as well as glandular recurrences. The recurrences had as a rule arisen very soon after operation, on the most after a few months' freedom from symptoms. On admission the patients had extensive tumorous formations in the operated area and were as a rule in a poor general condition.

On six of them minor operations had been performed, seven had had semi-resections done as well as clearing out of the glands. The radiological treatment has consisted in local radium applications, where this was possible, and external roentgen treatment. The results here have been bad as in the recurrences in the previous groups.

Section D. Inoperable cases. Radiological treatment only

All the 24 patients were admitted to Radiumhemmet with extensive, breaking down necrotic tumours. In one case the tumour involved the anterior part of the mandible and had infiltrated the tongue. In 17 cases it had spread over the greater part of the mandible with infiltration of the floor of the mouth and the cheek and in six cases it was localised to the posterior part with infiltration of fauces and tonsils.

The radiological treatment has consisted in local surface application of radium, roentgen rays and in a few cases radium treatment at a distance. No case has been rendered free from local symptoms, palliation only having been obtained, in one case even up to three years' duration.

Survey of the results and the different forms of treatment

Great difficulties are encountered in the treatment of mandibular cancer with radium. This is because the periosteum of the mandible is exceedingly sensitive to radium and in employing the ordinary doses in treatment of cancer it can scarcely be avoided causing permanent damage to the periosteum, early and ultimate necrosis of the bone thereby arising, in which remaining cancerous rests, if any, may take on a rapid growth. It seems best, therefore, only to subject small movable tumours to radiological treatment. The recovery of the more extensive tumours seems to have been considerably augmented by a combination of pre-operative local radium treatment, diminishing and limiting the tumour, and subsequent resection or electro-endothermy.

The only statistics existing showing the results of radiological treatment of mandibular cancer is one by SCHREINER; this author got six patients out of 15 belonging to group I free from symptoms, three of whom have been alive for more than three years, and of 24 patients belonging to group II he got six temporarily improved but no permanent recovery. Despite the adverse conditions for the radiological treatment of mandibular cancer the 5-year recoveries are as many as for the surgical methods of treatment.

HÄGGSTRÖM has obtained 5-year recoveries in three cases of nine, or 33 %.

Buccal Cancer

Survey of the material

During the 17 years from 1909 to 1925 altogether 73 cases of buccal cancer have been treated at Radiumhemmet. Of these 62 cases have

been under observation for at least three years and 45 at least five years and thus allow 3- and 5-year statistics.

Microscopical diagnosis is only lacking in two of the 13 cases now living and is also available in most of the other cases, rendered free from symptoms. A general survey of the material will be found in table IX, arranged on the same principles as in lingual cancer (page 476—478). These cases, however, have only been divided into three sections in difference to the classification in cases of lingual and sublingual cancer.

Section A. Comprising operable and inoperable cases, treated exclusively, during 1909—1924, by radium or roentgen

In this section I have collected 34 cases of buccal cancer. This group has not been divided into operable and inoperable cases, it being difficult to draw the line between the two. An idea of the nature of the material may be obtained from the following brief clinical data.

15 of the 34 cases had the tumour localised to the anterior or middle part of the bucca and the tumour was well limited to the size of up to a penny-piece. Surgical excision of the tumour was therefore possible. Two of these patients, however, had definite glandular metastases on admission. In the 19 remaining cases the tumour had either extended over the whole cheek, located in the hindmost part of it, or encroached upon the mandible or maxilla, in most cases causing destruction of bone as shown by roentgen. Operation in this stage has been unthinkable without doing extensive resections of bucca and alveolar processes. The majority of the cases had in addition extensive glandular metastases already on admission.

20 of the 34 cases had on admission to Radiumhemmet no demonstrable metastases and thus belong to group I. All these cases have had exclusively radiological treatment, the earlier cases roentgen only and cases from more recent years also radium treatment. The results from the treatment will be clear from table X.

How difficult it is to judge of the »end results» in this localisation of the tumour will be understood from the fact that of the seven patients who were free from symptoms for five years, only four are alive at present, free from symptoms.

A woman, aged 69 at the commencement of treatment in 1909, developed local recurrence and glands after having been free from symptoms for seven years and died before long in cachexia. A man, aged 64 (1914), was free from symptoms for ten years, when he developed cancer afresh in the other cheek: this was not treated at Radiumhemmet but was electro-coagulated in

Table IX *

Survey of 73 cases of buccal cancer treated at Radiumhemmet 1909—1925.

Clinical section and treament	Group	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	Total
A. Operable and inoperable. Radiological treatment only	I	1 [1] 1		1 1	4 [2] 1111	1 1	2 [3] 1	2 [4] 1		1 [5] 1		5 1111	2 11	1 1					4 liv. 20 16 dead
	II	1 1					1 1		3 111	1 1	1 1	1 1	3 111	1 1		1 1	1 1		0 liv. 14 14 dead
B. Combined surgical and radiological treatment	I													1 1	4 [7] 11 [8]	5 1	1 1	2 1	9 liv. 13 4 dead
	II													1 [6] 1	3 111	5 [10] [9] 1111	3 111	3 111	0 liv. 15 15 dead
C. Operation. Recurrences. Radiological treatment	I						1 [11] 1					1 [12] 1	2 11	1 1					0 liv. 5 5 dead
	II		1 1		1 1		1 1							1 1		1 1	1 1		0 liv. 6 6 dead
Total		2 2	1 1	1 1	5 5	1 1	1 5 4	1 2 1	3 3	2 2	1 1	1 7 6	7 7	2 6 4	2 7 5	4 12 8	1 6 5	1 5 4	13 liv. 73 60 dead

[1]) Free from symptoms for 7 years, then local recurrence, and glandular metastases, death. — [2]) Free from symptoms for 4 years, then local recurrence and metastases. — [3]) Free from symptoms for 10 years, fresh cancer, electro-coagulation, death. — [4]) Free from symptoms for 10 years, fresh cancer, unaffected by radiological treatment, still alive. — [5]) Free from symptoms for 3½ years, death from cerebral haemorrhage. — [6]) Free from symptoms for 1 year, then suicide. — [7]) Dead, free from symptoms, in cardiosclerosis after 3½ years. — [8]) Dead free from local symptoms in bronchial and pulmonary cancer after 3½ years. — [9]) Dead free from symptoms after 4 years in pneumonia. — [10]) Free from symptoms for 1 year, then recurrences locally and in glands, death. — [11]) Free from symptoms for 6 years, then recurrences locally and in glands. Death after 7 years. — [12]) Free from symptoms for 2 years, then recurrences locally and in glands. Death after still another year.

* Explanation of table, see p. 476—478.

another hospital. He subsequently died from metastases. The third patient, finally, a man, aged 52 (1915), developed a fresh cancer after having been well for ten years; he only came to Radiumhemmet for this, however, when it had spread to an extent that rendered every treatment futile.

This late occurrence of recurrences in buccal cancer seems to be fairly usual and is undoubtedly due to the fact, that these tumours arise on the base of remaining small leukoplakias, which have not disappeared by the preceding localised radium treatment.

14 cases had on admission fully developed metastases. 12 cases were far advanced with the tumour extending over the whole cheek or infiltrating muscles and skin as well as alveolar processes. Most of the patients were in a very bad general condition with a considerably lowered reactionary capacity for the treatment. As a rule the tumours reacted only by central liquefaction and peri-tumorous oedemas and slow progression. A noteworthy feature here is the

Table X *

Survey of the therapeutical results in 73 cases of buccal cancer after 1, 3 and 5 years.

Clinical section and treatment	Group	Cases 1909—1925		Cases 1909—1923		Cases 1909—1921	
		Number of cases	Free from sympt. 1 year or more	Number of cases	Free from sympt. 3 years or more	Number of cases	Free from sympt. 5 years or more
A. Operable and inoperable. Radiol. treatm. only	I	20	9 (45 %)	20	9 (45 %)	20	7 (35 %)
	II	14	0 (0 %)	13	0 (0 %)	12	0 (0 %)
	I+II	34	9 (27 %)	33	9 (27 %)	32	7 (22 %)
B. Combined surgical (endothermy) and radiol. treatm.	I	13	11 (85 %)	10	9 (90 %)	1	1 (100 %)
	II	15	3 (20 %)	9	1 (11 %)	1	0 (0 %)
	I+II	28	14 (50 %)	19	10 (53 %)	2	1 (50 %)
C. Operation. Recurrences. Radiol. treatm.	I	5	2 (40 %)	5	1 (20 %)	5	1 (20 %)
	II	6	0 (0 %)	5	0 (0 %)	4	0 (0 %)
	I+II	11	2 (18 %)	10	1 (10 %)	9	1 (11 %)
A—C. The whole material	I	38	22 (58 %)	35	19 (54 %)	26	9 (35 %)
	II	35	3 (9 %)	27	1 (4 %)	17	0 (0 %)
	I+II	73	25 (34 %)	62	20 (32 %)	43	9 (21 %)
B—C. Operation, radiol. treatm. and oper. recurr. radiol. treatm.	I+II	39	16 (41 %)	29	11 (38 %)	11	2 (18 %)

* For explanation of table, see p. 478.

relatively long survival as compared with the lingual cancer, in that most of these patients, in spite of their bad general condition, lived for almost a year or longer after the treatment had commenced, whereas the lingual cases died within half of that time. A considerable palliative effect, however, was obtained in two cases, rendered free from local symptoms for 11 months.

Section B. Combined surgical and radiological treatment

This section includes those cases where the primary tumour has been excised and which have subsequently been treated prophylactically by radium or roentgen. 13 cases had no glandular metastases at the operation and thus belong to group I. Nine cases were well operable with the tumour limited to the mucous membrane and extending over an area, the size of up to a half-crown, while in four cases the tumour had extended over the whole of the cheek, infiltrating mandible or maxilla and muscles and consequently not operable without extensive resection. All the tumours were ulcerating. In four of these cases the tumour had been surgically treated by knife at some other hospital. The remaining nine were treated with electro-endothermy at Radiumhemmet. Most of the cases have received post-operative local treatment by radium but those cases where the coagulation had extended far outside the tumorous tissue were not so treated. All have been having prophylactic roentgen treatment over the glandular area.

With regard to the primary result the four cases, operated upon by ordinary knife, became locally free from symptoms and are still alive in that state with the exception of one (1923) who died free from symptoms six months after the operation from cerebral haemorrhage. Of the nine cases treated by electro-endothermy eight became free from local symptoms and have had no local recurrences since. One of them only never became free from local symptoms. With regard to the ultimate results the reader is referred to table X.

15 cases had glandular metastases at the time of operation. True, that the glands were dissected in four cases only, the microscopical diagnosis of cancer of the glands being therefore only available in these cases, but the remaining cases had all clinically certain metastases of the glands. As regards the extension of the primary tumours nine had spread over the greater part of the cheek, infiltrating muscles and in some cases also the skin. In the great majority of cases the alveolar processes were also infiltrated with clear roentgenological changes of the bone. The glands were as a rule fixed and unaccessible for surgical dissection.

All these 15 cases have been treated by electro-endothermy at Radiumhemmet.

Three cases died in connexion with the operation (10 % mortality), one in pneumonia, one from haemorrhage and one in pneumonia in connexion with a plastic operation that had to be done six months after the electro-endothermy.

Of the remaining 12 cases there were only two who did not become locally free from symptoms, three lived free from symptoms for a year or more and one free from symptoms for four years, then dying in pneumonia. The remaining cases died from local recurrences and glandular metastases.

The treatment by electro-endothermy, especially in buccal tumours, has been practised by me since 1921 in all cases where this has been possible and in my opinion this method is decidedly superior to the ordinary surgical measures as well as radium treatment. The advantages over the usual surgical method may be summarised in the following points:

1) Destruction of the tumour is caused by heat produced in the tissue, eliciting a powerful reactionary inflammation in surrounding tissues.

2) No blood- or lymph-channels are opened up during the operation. In this way the risk of local recurrences and metastases is diminished.

3) The operation claims very little time and is little trying to the patient.

The following are the advantages of electro-endothermy over radium treatment:

1) It is much easier to do than the technically difficult surface application of radium.

2) The subsequent reaction causes very little inconvenience to the patient and immediately after the operation all pains from the infected and ulcerated tumour cease.

3) The primary as well as the end results are considerably better.

With regard to the details of electro-endothermy the reader is referred to my paper in Acta Otologica, where he will find a detailed account of material, technique and results.

The decided improvement in the results obtained, as compared with those by purely radiological treatment, are, in my opinion, in the main to be ascribed to the electro-endothermy.

Section C. Operation. Recurrences. Radiological treatment

Five cases had no metastases at the operation, nor had the glands been dissected here. All had local recurrences on admission; in three

of the cases these had arisen immediately after operation, in the others after more than one year. Of the six patients belonging to group II two only had been operated upon for the primary tumour as well as the metastatic glands. All had local recurrences on admission and five had extensive metastases of the glands.

All these recurrences were extensive on admission, infiltrating the whole cheek, growing in a diffuse manner and very difficult to treat, the general view of the mouth being greatly limited on account of marked trismus.

The recovery percentage is, as in other recurrences, very low.

Survey of the results and the different forms of treatment

The *radiological treatment* at Radiumhemmet has been of very varied nature during the period of time from 1909 to 1924. The very early cases were treated by roentgen rays. This form of treatment, however, gives bad results, for it is only possible to attack the tumour from some outside field, as the trismus and the extension of the tumour makes it impossible to treat from inside the mouth. In addition, roentgen treatment causes marked atrophy of the whole of the mucous membrane of the mouth. The unfavourable experiences gained of roentgen treatment have also been confirmed by JÜNGLING, WERNER, PINCH and others. I have been unable to find a single case of buccal cancer in the literature cured by roentgen treatment.

The radium treatment may be carried out partly by radium at a distance, partly by application of radium tubes on the surface of the tumour, fixed there in an applicator of plastic mass and finally by intubation of radium needles or emanation capillaries. With radium treatment the results have gradually been improved. BARCAT, in 1914, is referring to some cases treated with surface applications by GUSSENBAUER and DOMINICI, which improved but did not become free from symptoms. WERNER, too, has obtained improvement but not freedom from symptoms. REGAUD has treated 11 cases. Five of these were treated with intubation of radium needles and three of them remained free from symptoms for more than two years. SIMMONS has only had a bad experience of radium treatment. Of 21 cases, which he considered to be early, two only were rendered free from symptoms for more than three years. He only makes use of radium, therefore, as a satisfactory palliative means in far advanced cases and in such cases he believes he gets considerable improvement in at least 85 % of his cases. QUICK treated, from 1919 to 1923, 15 cases with emanation capillaries and obtained freedom from symptoms in 35 % for three years or longer.

Surgical treatment only, uncombined with other methods, seems,

at best to give recoveries in up to 15—25 % of the cases for three to five years. STERNER has 16 cases, 14 dead during the first year; MELLER 53 cases of which eight (15 %) lived free from symptoms for more than three years; COLLINS WARREN has eight cases, no recovery; MORESTIN 25 cases of which two (8 %) lived free from symptoms for two years and finally DOLLINGER's 26 cases, of which three lived free from symptoms for three years. HÄGGSTRÖM's Swedish statistical data on 16 cases from 1916—21, operative cases only, shows four (25 %) living after five years.

Radiological treatment only of 20 operable and inoperable tumours shows a 3- and 5-years recovery in 27 % and 22 % respectively and electro-endothermy immediately followed by radiological treatment, 3-years recovery in 53 %. Both these methods, therefore, seem to be superior to the ordinary surgical operation by knife. In my opinion electro-endothermy followed by radiological treatment is the method that gives the best results.

The prophylaxis in buccal cancer

27 of the 73 cases of buccal cancer exhibited extensive leukoplakias on admission to Radiumhemmet. It is generally held that buccal cancer very often arises on the base of chronic irritable conditions in the mouth leading to the formation of leukoplakias. These leukoplakias pass as a rule insiduously and without any more severe symptoms into fresh malignant formations which subsequently spread rapidly over large parts of the cheek, infiltrating muscles and skin as well as alveolar processes in the upper and lower jaws. FOURNIER maintains that at least 30 % of leukoplakias in the mouth pass into cancer. Prophylactically, therefore, it is of exceedingly great importance to treat these leukoplakias before they begin to undergo malignant degeneration.

Radiological treatment is unsuitable as the leukoplakic cells are relatively little sensitive to radium and fairly large doses are necessary for their treatment. They are also frequently of such great extension that the radium treatment would be expected to cause secondary atrophies of the tissues.

Excisions of widespread leukoplakias are often troublesome on account of the difficulty of making good the defects.

On the other hand it is a rational procedure to treat the whole changed area by electro-endothermy for a depth of a few millimetres. For this superficial endothermy with flat electrodes no other anaesthetisation is needed than painting of the mucous membrane with a 20 % solution of cocaine. The treatment can be carried out in the Outpatient department. It is important to carry out the electro-endo-

thermy sufficiently extensively so as to ensure healthy epithelium to cover the defects. After about a week the wound will be found to have cleaned up and after three weeks to a month epithelium will have formed. With this technique I have for the last six years treated a number of leukoplakias and papillomata in the mouth with good result.

Cancer of the tonsil

40 cases of cancer of the tonsil have been treated at Radiumhemmet during the period 1915—1926. This form of cancer is clinically one of the most malignant forms of tumour and from the point of view of treatment one of the least responsive. According to an investigation by BRODERS tonsillar cancer is mainly made up of immature undifferentiated cells. The tumour gives early troublesome symptoms with extensive ulcerations and early metastases: it is consequently diagnosed relatively early and comes for treatment, on an average, already within 3—4 months after the onset of the first symptoms. The course of the disease, however, is of so violent a nature as to lead to the death of the patient already within the first year.

Among the cases at Radiumhemmet 13 belong to group I and had thus, on admission, no metastases.

During the first few years the patients were given external roentgen treatment and local surface application of radium but in recent years I have made use of distant treatment by radium from the outside, local surface treatment by radium and implantation of radium needles in the rests of the tumour.

As will be seen from table XI, however, the results from the treatment have so far been fairly bad. The fact of freedom from symptoms for more than one year having been obtained in three cases from 1925 yet points to the possibility that better results may be obtained with the present technique.

All the methods of treatment give the same bad result.

Three cases of tonsillar cancer, primarily healed by roentgen rays only, have been published. Nine authors have each published one or two cases recovered through radium treatment. QUICK has obtained primary freedom from symptoms in 28 of 124 cases of tonsillar cancer treated by radium in emanation capillaries. Nor is there any more extensive statistical data available with regard to surgical results. MATTHEWS has published three of his own cases of tonsillar cancer well operable, all dead in rapidly arising recurrences.

In table XI will be found a general survey of the temporary results obtained.

Table XI

Cases of tonsillar cancer temporarily improved and free from symptoms

Temporarily improved, then aggravated		Free from symptoms, then recurrences		Alive free from symptoms	
Number of cases	Duration	Number of cases	Duration	Number of cases	Duration
2	1 year	2	3 months	3	1 year
1	1½ »	5	1 year		
1	2 »	1	2 years		
1	3 »	1	2½ »		
1	4 »				

Sarcoma of the tonsil

32 cases of tonsillar sarcoma have been treated at Radiumhemmet during the period 1915—1925. Of these 24 have been under observation for at least three years and 21 for at least five years. With regard to details in the clinical course, diagnosis and treatment of tonsillar sarcoma the reader is referred to my papers in Acta Radiologica, vol. VI (Xenia Forsselliana), page 183—209 and to »Erfahrung über die Klinik gewisser bösartigen Geschwülste der oberen Luft- und Speisewege» by G. Holmgren and E. Berven, page 257—329.

A general survey of the material will be found in table XII, arranged in a similar manner as that of the cases of lingual cancer, page 476—478. The therapeutical results are tabulated in table XIII.

The tonsillar sarcomata occur as irregular, rounded, sometimes pedunculated tumours, often of a blue-red or grey-yellow coloration. The consistence is clearly harder than normal or infected tonsillar tissue but not so hard as the tonsillar cancer. Ulcerations are relatively rare, arise in a late stage and differ in a characteristic manner from cancerous and luetic ulcerations. Under the microscope this type of tonsillar sarcoma is as a rule a lymphosarcoma. Another type of sarcoma is one growing in a more infiltrative manner, with earlier ulcerations and much more malignant, often made up of large and spindle-shaped cells.

Metastases develop very early and are often the first sign, especially in lymphosarcomata. In my material 23 cases had already on admission clinically demonstrable metastases.

The prognosis in the case of these metastases, however, is very much more favourable than in the cancerous metastases.

The majority of the treated sarcomata have been of the lymphosarcomatous type; 14 only have been of another type.

The diagnosis has as a rule been made early, the patients having come for radiological treatment three to four months after the onset of the first symptoms.

Table XII*

Survey of 32 cases of tonsillar sarcoma treated at Radiumhemmet 1915—1925

Clinical section and treatm.	Group	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	Total
Operable and inoperable. Radiological treatment	I		1 [1] 1	1 [2] 1		2 11		1 1			3 11 1	1 1	6 liv. 9 3 dead
	II	2 [3] 11	2 1 [4] 1	1 1	2 [5] 11	2 1 [6]	2 11	5 1 [7] 111	1 1	2 1 [8]	1 1	3 1 11	7 liv. 23 16 dead
	Total	2 2	3 1 2	2 2	2 2	4 3 1	2 2	6 2 4	1 1	2 1 1	4 3 1	4 2 2	13 liv. 32 19 dead

In some cases tonsillectomy has been performed but in all of them rapid recurrences have arisen already within the course of 14 days to three weeks after the operation.

The patients have been methodically treated along the following lines, strictly adhered to: in the first place external roentgen rays, occasionally radium treatment at a distance, until the size of the tumour has diminished to about half that of an ordinary tonsil, when the remains of the tumour have been treated with surface application of radium. The tumour has as a rule continually diminished in size under this treatment and as a final result we get a tonsillar crater with a perfectly smooth surface without any trace of any tumour or lymphoid tissue.

The therapeutical result will be clear from table XIII, showing a remarkably great recovery percentage.

This result conforms with those obtained by radiological treatment in other clinics. Some 30 authors have each published solitary cases of healed tonsillar sarcoma but there is only one lot of more extensive statistics in the literature, by QUICK, comprising 24 cases of tonsillar sarcoma, six of which were rendered free from symptoms,

[1]) Free from local symptoms, dead in intercurrent disease after 7 months. — [2]) Locally free from symptoms, dead in intercurrent disease after 11 months. — [3]) Locally free from symptoms for 3 years, dead after 3 years in metastases. — [4]) Never free from symptoms, dead after 1 year. — [5]) Locally free from symptoms, dead after 10 months in metastases. — [6]) Locally free from symptoms, then recurrence, dead after 7 months. — [7]) Locally free from symptoms, dead in intercurrent disease after 6 months. — [8]) Locally free from symptoms, dead in intercurrent disease after 10 months.

* For explanation of table, see p. 476—478.

Table XIII *

Survey of the therapeutic results in 32 cases of tonsillar sarcoma after 1, 3 and 5 years

Clinical section and treatment	Group	Cases 1916—1925		Cases 1916—1923		Cases 1916—1921	
		Number of cases	Free from sympt. 1 year or more	Number of cases	Free from sympt. 3 years or more	Number of cases	Free from sympt. 5 years or more
Operable and inoperable. Radiological treatment	I	9	6 (67 %)	5	3 (60 %)	5	3 (60 %)
	II	23	8 (35 %)	19	6 (32 %)	16	3 (19 %)
Total	I + II	32	14 (44 %)	24	9 (38 %)	21	6 (29 %)

* For explanation of table, see p. 478.

besides statistical data by HEYERDAHL, who has published five cases of tonsillar sarcoma, all recovered.

The good results obtained by radiological treatment only stand in sharp contrast to those obtained by surgical methods. KUNDRAT who was the first to describe and differentiate the lymphosarcomata holds them to be very malignant, frustrating all efforts of extirpation, and considers them to be a »noli me tangere» for surgical methods of treatment.

This is also confirmed by surgical statistics which do not show any lasting recoveries. What seems possible to attain is freedom from local symptoms, generally not lasting for more than a year. In a statistical tabulation MATTHEWS gives 20 well operable cases of tonsillar sarcoma in an early stage in which tonsillectomy was performed. Three of these lived for a year but in none of them did the local recovery last as long as two years. Among MATTHEWS's collection of 84 cases of tonsillar sarcoma there is only one living free from symptoms after three years.

It is clear therefore, from the discouraging results of surgical methods and the good results obtained by solely radiological treatment, that tonsillar sarcomata should preferably be left entirely for radiological treatment without any previous surgical operations.

In addition there are some rare forms of tumour of the tonsils, such as lympho-epithelial growths, which react excellently to radiological treatment as well as some mixed forms which appear to be best treated by a combination of radiological and surgical methods.

The origin and development of glandular metastases and their importance for the prognosis

As shown by experience of old and the statistical data submitted here, the occurrence of manifest metastatic formations of glands plays a decisive rôle for the prognosis. Our knowledge, however, concerning the processes in the organism precedent to the spread of the cancerous infection or the cancerous cells from the primary tumour to the nearest glandular station, is fairly incomplete and the function of the lymphatic glands as protective organs is still debated. As the view on these two factors must play a decisive part in the choice of therapy in glandular metastases, I propose to submit a brief review of the present position of research in this respect.

A tumour cell may disseminate from the primary tumour to the regional lymphatic gland in two ways, either through direct growth in the lymphatic channel, *per continuitatem*, or through the formation of tumorous cell-emboli which get first stuck in the gland, *per emboliam*.

It is probably only by a close study of facts and a critical judgment of these that it is possible to decide for each form of tumour in which way or ways it forms metastases and thereby arriving at the individualised form of treatment for each kind of tumour, which is the first condition for attaining a happy result of the treatment.

In metastatic formations *per continuitatem* it can be seen under the microscope how more or less continuous thin strings of tumorous cells proceed in the lymphatic channels to a place, usually a lymphatic gland, where a suitable soil seems offered to the cells. A lively proliferation of tumorous cells takes place here, resulting in macroscopical palpable metastases. As the prototype for this form of metastatic formation HANDLEY described the dissemination of mammary cancer but he maintains that this extension along the lymphatic channels is also the main metastatic procedure for the majority of other forms of cancer. According to this investigator embolism by way of lymphatic channels is purely of secondary importance. The general accepted view is that *per continuitatem* is the most usual form of metastatic formation but on this point opinions vary even with regard to such a thoroughly explored subject as mammary cancer. It is thus maintained by EWING, for example, that in spite of minute investigations he has repeatedly been unable to find any continuous connexion between the primary tumour and the axillary metastases.

Most pathologists would seem to agree, however, that metastatic formation in cases of tumours of the mouth takes place *per emboliam*, but opinions vary even here. BLOODGOOD, for example, thinks that also

in lingual cancer metastases form *per continuitatem* and that the bad result from dissecting the glandular region is due to that the primary tumour and the lymphatic channels are unable of being removed in one piece as in mammary cancer.

It is generally believed that the more rapidly growing epidermal and glandular cancers form metastases *per emboliam* and the more slowly growing tumours, especially then cancer of the skin, *per continuitatem.*

The way metastases form must obviously be of fundamental importance in deciding the nature of a surgical operation. Dissemination *per continuitatem* necessarily demands, of course, that the primary tumour and the contents of the glandular area should be removed in one piece, whereas embolic dissemination permits the extirpation to be done separately for primary tumour and metastases.

If the way the cancer cell disseminates to the first glandular station is little known, no more complete is our knowledge of the way the lymphatic gland reacts to the cancerous cell taken up; the views on this point are fairly much at variance.

HELLMAN has devoted a detailed work to the investigation of the origin, development, nature and function of the lymphoid tissue and in several papers brought forth the results of his investigations.

He is decidedly of the opinion that the lymphoid apparatus, in addition to its function of forming lymphocytes, must be really charged with the task of protecting the organism. This protection is in the first place realised through the filtrating capacity, possessed by the lymphatic glands on account of their structure, of taking up and retaining toxic and infectious noxa.

It was shown in 1919 by HELLMAN that, in the lymphogenous embolic dissemination of cancer cells, a metastatic growth as a rule develops in the marginal sinus of the periphery of the lymphatic gland. The cancerous cell is prevented from forcing its way into the interior of the gland by the filtration capacity of the peripheral parts. On account of their alien chemical constitution the toxic cancerous cells bring forth reactive changes already at their entry in the marginal sinus. These changes appear under the microscope as a *sinus catarrh* which must be looked upon as an inflammatory reaction against an invading toxin, virus or cancer cell and be considered as a pre-cancerous condition. There is no doubt that a microscopical examination, minutely carried out in every detail, which is not of course usually done in the way of diagnosis, would in most cases already at this stage be able to demonstrate emboli of tumorous cells.

How frequently such emboli can really be detected will be clear from the following statements from the literature. In 28 cases of deaths

from cancer M. SCHMIDT found tumorous emboli in the pulmonary vessels in all the cases, while true metastases were found to be developed in only 13 of them. Among 32 cases operated upon for tumours of the mouth with clearing out of the glandular area, tumorous emboli were found in 29 cases (GUSSENBAUER) and among 117 cases of mammary cancer cancerous emboli were found in the glands in 115 cases.

The frequency of fully developed metastases as clinically demonstrated and shown by ordinary microscopical examinations is of course very much less.

It is clear, therefore, that tumorous cell-emboli occur to a much greater extent than the fully developed glandular metastases and this must indicate that the organism is able to take charge of and largely destroy the tumorous cells taken up by the lymphatic glands. Most of the emboli do not develop into metastases but get their virulens reduced, become destroyed and surrounded by fibrous tissue, organised into a surrounding capsule.

This activity of the lymphatic glands as against injurious substances taken up, especially then those preeminently poisonous to the organism, has also been subject to a detailed study by HELLMAN. He has thus shown that the time-honoured Fleming's germ centres are by no means centres for the production of lymphocytes but that they must be looked upon as reactionary centres against invading toxins or bacteria, etc. They have therefore been called by HELLMAN secondary follicles. These secondary follicles appear in very different forms as regards size, contents of cells, structure of cells, stainability, etc., all depending upon the different reactionary stages in which they are found. It would seem as if HELLMAN's conception of the function of the lymphoid tissue had gradually gained general consent from histologists as well as pathologists. HEIBERG has studied the different reactionary stages of the secondary follicles. EWING has likewise pointed out the passive filtering and actively destructive effect of lymphatic glands upon tumour cells and further shown how embolic cancerous cells may be directly destroyed in the lymphatic glands and how already clearly developed cancerous metastases may be destroyed and encapsuled in fibrous tissue.

Lymphatic glands must therefore be regarded as true protective organs against the spread of cancer as long as their function is unimpaired, and until then it would also seem inappropriate to interfere with their protective function as guided by the biological laws laid down for them, of which, so far, we have no knowledge. Without true scientific basis for our actions and without the experience we have built up thereon to the effect that our operations give better results than nature's own defensive powers, we have no right to in-

terfere. Our intervention must not be the cause of impairment of the general condition of the patient and thereby his local as well as general reactionary capacity against the disease.

Lymphatic glands, however, may be exposed to strains which they are unable to overcome. Instead they then suffer such damage themselves as to succumb in their fight against an invading virus or infection.

The first clinical sign of such a disturbed function is enlargement of and an alteration in the consistency of the lymphatic glands, indicating that the cancerous cells begin to spread in them, overcoming their reactionary capacity. The practised examiner can probably then, already at an early stage, diagnose the glandular metastases in areas available for palpation.

Mistakes in diagnosis may take either direction. In one case chronically infiltrated glands, enlarged through inflammation, may be taken for metastases (a case in group I being thus transferred to group II (page 477); in another case true glandular metastases or such of clinically latent nature may be overlooked (a case in group II being thus transferred to group I).

It is difficult to say to what extent these mistaken diagnoses are being made. At Radiumhemmet it seems to be of more common occurrence that glands clinically suspected of cancer only prove to be the seat of inflammatory processes than that clinically non-palpable glands prove to be the seat of developed metastases. The importance of the sinus catarrh as a pre-cancerous symptom must, however, always be borne in mind. Simmons has been able to make a numerical estimation of the mistaken diagnoses in his material. Of 16 glands clinically suspected of being cancerous 9 proved not to contain obvious metastases, whereas of 9 clinically free glandular areas 2 proved to contain metastases. The experience of this worker, therefore, is the same as that of Radiumhemmet. It is generally held, however, that where metastases really do occur a great many glands beyond those palpable are generally found to be the seat of cancerous infiltration.

The glandular apparatus must probably be regarded, quite early in the stage of clinically demonstrable metastases, as overcome by the disease; the organism is then in need of a rapid and, if possible, an effective aid from without, whether by some surgical procedure or some other method.

In estimating the protective function of lymphatic glands against the spread of tumours, it is important to bear in mind that the protective capacity of the glands may be largely reduced by a few additional circumstances.

As such a circumstance may be mentioned the occurrence of a

mixed infection. The lymphatic glands have then to combat not only the cancerous invasion but also the septic infection and the fight against this twofold enemy soon seems to be too much for them. We then get liquefying cancerous glands with central liquefaction and progression in the periphery with extensive periadenitis and finally the supervention of extensive areas of liquefaction and fistulous formations.

It is important for the prognosis therefore, to reduce the mixed infection in the mouth as much as possible.

Some of our therapeutic measures also seem able to a certain extent to favour this secondary mixed infection. A marked overdose of radium gives rise to extensive necrosis of the tumour as well as surrounding healthy tissue and in this necrotic area a secondary infection may very easily occur, spreading to the glands.

An extensive electro-coagulation with elimination of large masses of necrotic tissue may likewise serve as a good soil for secondary infections, unless exceedingly careful hygienic measures are kept up.

A purely mechanical trauma, even in such slight form as repeated palpation, may also apparently activate the malignancy of the metastases.

If the normal tissue of the lymphatic gland has been destroyed by the cancerous cells, fresh cancerous emboli are sent out to the nearest lymphatic station where the development proceeds as in the previous one. Gradually the metastatic cancerous process breaks through the capsule of the gland, destroys this and subsequently extends without hindrance into surrounding lymphatic vessels and lymph-spaces, destroying the capillary walls; a generalised dissemination has then commenced. The transition to this stage is clinically characterised by a commencing fixation of the lymphatic glands to the surroundings and by the occurrence of palpable lymph-strings between the different individual glands; both these phenomena constitute the first sign of a commencing inoperability.

Most authors regard it as quite impossible to express any opinion as to the probability of the occurrence of clinical glandular metastases and the time of their appearance, as clues are lacking for the judging of these conditions. It has been pointed out by Ewing, however, that the clinical nature of the tumour provides a certain intimation in this respect. He thus states that the papillary and superficially growing tumours give rise to relatively late metastases, while the deeply growing early ulcerating and infected tumours occasion early metastases.

An interesting suggestion for the early estimation of the malignancy of a tumour has been made in recent years by Broders of the Mayo

Clinic, where he has investigated a large number of tumours, 1,628 cases in all. He has attempted to grade their malignancy according to the degree of maturity of the cells, as determined by their histological characteristics. He divides the tumours into four grades, 1—4, a pronounced differentiation characterising most of the cells in grade 1 and grade 4 holding only immature, undifferentiated cells. In coupling this grouping in tumours of the mouth with the results obtained from the treatment he found that in grade 1 primary healing was obtained in about 92 %, in grade 2 62 %, in grade 3 25 % and in grade 4 in, on the most, 10 % of the cases. According to this author lingual cancer, for example, is mainly said to consist of cells of the second and third degree of malignancy, while tonsillar cancer is mostly built up of cells belonging to the third and mainly to the fourth degree of malignancy. The cancer cells in cancer of the cheek, lip and floor of the mouth belong mainly to the second and partly to the third degree of malignancy.

Although this grouping only takes regard to purely structural conditions and biological points of view are unable of being considered, determination of the degree of maturity of the primary tumour might nevertheless give some intimation in an early stage as regards the prognosis. In this way some indication might also be had as to the advisability of undertaking an extensive surgical operation of the glandular area in an early stage.

Our knowledge of this and allied questions would no doubt gain by the cooperation between the clinician and the pathologist being more intimate and personal than is generally the case at present.

Most authors consider it impossible to express an opinion with any degree of certainty as regards the point when clinically demonstrable metastases are first apparent. I have been examining the material pertaining to lingual cancer in order to find out whether it might throw some light on this point. After the first subjective symptoms have appeared two to four months generally seem to elapse, during the time of which the patient either does not see any doctor at all or else consults a doctor or dental surgeon without getting the diagnosis settled while the disease is in this early stage; or else purely palliative measures have been taken, such as extraction of teeth, touching with silver nitrate, gargling etc. Before this time no demonstrable metastases generally seem to have arisen which, if present, would of course have made one think of some more serious complaint. Most metastases seem to have arisen after five to six months. SIMMONS has arrived at about the same numerical result in his material of 376 cases of cancer of the mouth.

In most cases of tumours of the posterior part of the tongue the

metastases, however, seem to arise very much earlier and often almost simultaneously with the first subjective symptoms.

As will be seen from the following table the occurrence of metastases in lingual cancer at the commencement of treatment vary within wide limits, as stated by different authors.

Table XIV

Author	Number of cases	Number of cases with metastases	%
Radiumhemmet	86	30	35
Quick (New York)	128	59	46
Schreiner (Buffalo)	138	80	61
Simmons (Boston)	103	76	76
Ehrlich (Vienna)	51	40	80
Regaud (Paris)	114	98	86

This obvious difference in the occurrence of metastases can probably in most cases be explained by the fact that the diagnosis is made very much earlier where the occurrence of metastases is less frequent and that the patients consult the doctor at a much earlier stage of the disease.

There are some interesting numerical data from America on the point of mistaken diagnoses at the patient's first visit to the doctor, whereby palliative measures prescribed have caused delay for the patient in coming under expert advice. It is thus stated by Farr that among his cases of lingual cancer 66 per cent had had the diagnosis wrongly made at the first visit to the doctor and been given »poor advice». The figure submitted by Bloodgood is 50 per cent and Simmons states in 1926 that only 24 per cent of his cases have been delayed by mistaken diagnoses. The merit of an early diagnosis he ascribes to the intensive propaganda carried out in recent years.

Among cases of lingual cancer at Radiumhemmet about 25—30 per cent of the patients have been treated under a mistaken diagnosis with palliative measures only during the course of 3—4 months. The average duration before admission to Radiumhemmet or before surgical treatment being undertaken is about five months. In this short time, therefore, in 30 out of 86 patients, metastases have had time to develop, whereby the prognosis has been considerably aggravated.

It is of decisive importance, therefore, that an early and definite diagnosis be made. At commencing ulceration of the tongue or, on the whole, ulceration in the mouth palliative measures should never

be tried but the diagnosis immediately made or, where this is impossible, the patient kept under daily observation or be sent under expert treatment. The delay that a diagnosis *ex juvantibus* may cause in adopting the correct treatment may in many a case prove disastrous for the patient.

The relatively good results obtained in our country is mostly to the credit of the early diagnosis of cancer made by the Swedish doctors and the rapid way they have transferred the patients for operations or radiological treatment. The importance of an early diagnosis for the prognosis will be clear from table XIV, page 512, and table XVII, page 520. In table XV will be found a tabulation of the results obtained in lingual cancer in different clinics by different methods of treatment, grouped according to the occurrence or non-occurrence of metastases at the commencement of treatment. While the healing percentage in group I generally keeps between 30 and 40 per cent it falls in group II to, on the most, 13—17 per cent, all according to the duration of observation.

The possibility of attaining on the whole a better result in the treatment of cancer of the mouth can probably be best realised by endeavouring, through enlightment of the public and the doctors, to establish as early a diagnosis as possible, before yet metastases have had time to develop, and further, by finding a method of treatment of such metastases, more useful than those at present in use, that may lead to definite healing.

The treatment of glandular regions [1]

Division into different stages

In discussing the treatment of the glandular regions it would seem convenient to base the discussion upon the clinical condition of these regions at the commencement of the treatment and thus dividing the material into the following three stages:

Stage I: without any clinically demonstrable glandular metastases. *Stage II:* with clinically definite metastatic glands where the cancer is as yet localised to the glands themselves. *Stage III:* where the cancer has already begun to overcome the resistive power of the gland, pervaded this and is about to break through the capsular wall.

The boundaries between these three stages must always be somewhat fleeting and the mistaken diagnoses in the classification of the different cases for stage I and II, in particular, are probably to be found within relatively wide limits. Increasing clinical experience and

[1] The following account is mainly based upon the material of lingual cancer.

experience of the prognosis of malignant tumours will probably, however, enable the doctor to draw the lines around these two categories more and more narrowly.

Table XV

Comparative survey of results in cases of lingual cancer without and with glandular metastates by different methods of treatment.

Group	Statistics	Treatment	Number of patients	Free from symptoms	Duration
I.	Radiumhemmet	Combined surg. and radiol. treatment	56	59 %	1 year
			43	56 %	3 years
			33	49 %	5 »
	Häggström	Surgical	22	41 %	5 »
	Simmons	Surgical	29	35 %	3 »
		Radiological	31	15 %	3 »
	Mayo Clinic	Surgical	21	45 %	3 »
			18	38 %	5 »
	Schreiner	Combined	50	32 %	1 »
	Simpson	Combined	55	72 %	1 »
II.	Radiumhemmet	Combined (operable and inoperable cases)	30	7 %	1 »
			26	8 %	3 »
			21	5 %	5 »
		Combined (operable and operated cases)	8	25 %	3 »
			7	14 %	5 »
	Häggström	Surgical	15	13 %	5 »
	Simmons	Surgical	25	4 %	3 »
		Radiological (operable and inoperable cases)	108	0 %	3 »
	Mayo Clinic	Surgical	8	17 %	3 »
			5	10 %	5 »
	Schreiner	Radiological (operable and inoperable cases)	80	1 %	2 »
	Simpson	Combined (operable and inoperable cases)	60	11 %	1 »
	Ehrlich	Surgical	40	12 %	3 »
	Friedel	Surgical	134	15 %	3 »

Stage I

The discussion on the treatment of glandular areas would seem to be concerned with the question whether the prognosis is improved by dissection of the glandular areas even in this early stage and if so, to what extent this should be done. Opinions vary here throughout the whole scale from those who consider a surgical block dissection as an aggravating factor for the prognosis to those who hold that as early and radical dissection as possible of the glandular area is the only means for definite healing to take place. Most German surgeons as well as the American favour a radical dissection although lately a reaction seems to have arisen against the schematic block dissection of all glandular regions. CRILE does a complete dissection of the diseased side with ligation of the external carotid artery, external and internal jugular veins and dissection of the healthy side with ligation of the

external jugular vein. He says about this extensive operative method: »We have rarely missed securing a permanent cure in any case which had not progressed beyond the lymphatic planes of the neck.»

The results in tumours of the mouth are said to have risen from 29 per cent, three years healing, to 52 per cent, five years healing.

KÜTTNER states that in dissection in cases of cancer of the tongue with palpable glands recurrences developed in 39 per cent but that the recurrences fell to below 11 per cent when a radical bilateral dissection was done in all patients with or without palpable glands.

It is difficult to form a definite opinion in the matter from available statistical data, as in the different statistics the recovery figures are not submitted for the different stages but only for the whole material.

I have looked over the material of Radiumhemmet in order to try to contribute to the elucidation of the question of justification of extensive dissection of glands in those cases where metastatic glands not are demonstrable. It must be said from the outset, however, that it is impossible, in my opinion, to draw any definite conclusions from such small figures as involved in this material, especially in view of the small number of cases where the glands have been dissected and that, further, it is only by examining a larger material from this standpoint that a definite view on this question can be arrived at.

In table XVI have been tabulated the results in lingual, sublingual and buccal cancer in regard to whether the glands have been cleared out or not. I have given the recovery figures partly for the whole material, except the inoperable cases, partly for the cases treated by combined methods and finally for these cases excepting the recurrences, as these of course, with their pronounced poor prognosis considerably lower the recovery figure. For further details the reader is referred to the table.

The figures in this table do not indicate that a complete surgical dissection of the glandular areas in a case of early cancer of the tongue without clinical metastases would be an improvement of the result obtained through surgical or radiological exstirpation of the primary tumour only, immediately followed by post-operative application of radium or roentgen over the glandular areas.

There are only very few statements in the literature that can throw some light upon this question.

BUTLIN, one of the advocates of the double-sided dissection of glandular regions, states, however, that his own results with this extensive operation were no better than with less elaborate procedures. Of eight cases completely dissected first since metastases had appeared, three remained healed, or 37 per cent, while among 70 cases completely

Table XVI

Survey of 1-, 3- and 5-years freedom from disease in lingual, sublingual and buccal cancer in reference to whether glandular dissection was done in connection with excision of the primary tumour

Clinical section and treatment	Time of observation	No glandular dissection			Operated upon and glands dissected		
		Number of cases	Free from symptoms	%	Number of cases	Free from symptoms	%
Lingual cancer							
Whole material	1 year	39	25	67 %	17	8	47 %
	3 years	28	19	67 %	15	6	40 %
	5 years	20	11	55 %	14	5	34 %
Operable, solely radiol. treated and cases operated and proph. treated and recurr. radiol. treated. Group I.	1 year	39	25	67 %	8	6	75 %
	3 years	28	19	67 %	7	4	57 %
	5 years	20	11	55 %	7	4	57 %
Operable, solely radiol. treated and cases operated and proph. treated. Group I.	1 year	33	23	70 %	5	4	80 %
	3 years	23	17	73 %	5	3	60 %
	5 years	15	9	60 %	5	3	60 %
Sublingual cancer							
Whole material	1 year	13	10	77 %	4	2	50 %
	3 years	10	7	70 %	2	1	50 %
Operable, solely radiol. treated and cases operated and proph. treated and recurr. radiol. treated. Group I.	1 year	13	10	77 %	3	1	33 %
	3 years	10	7	70 %	1	0	0 %
Operable, solely radiol. treated and cases operated and proph. treated. Group I.	1 year	12	10	83 %	2	0	0 %
	3 years	9	7	77 %	0	0	—
Buccal cancer							
Whole material	1 year	66	15	23 %	7	0	0 %
	3 years	58	20	35 %	4	0	0 %
Operable, solely radiol. treated and cases operated and proph. treated and recurr. radiol. treated. Group I.	1 year	37	22	60 %	1	0	0 %
	3 years	35	19	54 %	0	0	—
Operable, solely radiol. treated and cases operated and proph. treated. Group I.	1 year	32	22	69 %	1	0	0 %
	3 years	30	19	63 %	0	0	—

dissected already before any clinically demonstrable metastases had arisen, only 24 patients, or 34 per cent, remained healed, thus about the same healing percentage.

SIMMONS, who is also an advocate of radical operation, though of the diseased side only, states that of his cases belonging to group I 35 per cent were rendered free from symptoms for three years with dissection of the glands but that 34 per cent were rendered free from symptoms for the same length of time without any glandular dissection. SIMMONS is explaining this strange coincidence in the healing results for cases operated with glandular dissection and those not so operated by saying, that the latter cases have been much earlier and therefore had a better prognosis. There is of course the possibility, however, that in the dissected cases the same recovery percentage might have been attained without operation by post-operative radiological treatment. On account of the results obtained SIMMONS also advises against glandular dissection in patients in group I whose general condition is lowered or can be expected to become impaired through the operation.

HÄGGSTRÖM's material of lingual cancer from different hospitals in Sweden during the years 1916—1921, cases which have only been operated upon and not received any radiological after-treatment, includes 22 cases without any certain clinical metastases and thus belong to group I. Of these cases 14 have not had their glands removed and of these 6 or 45 per cent are alive, whereas of the dissected eight cases three or 37 per cent are alive. Nor does this Swedish material, nearest comparable with that of Radiumhemmet, favour the idea of the prognosis being improved by an early removing of glands in group I.

QUICK, one of those who is most strongly opposed to a schematic dissection as early and extensive as possible, himself employs conservative methods and has obtained excellent preliminary results. Of 34 cases of operable lingual cancer without palpable glands 29 or 85 per cent were rendered free from symptoms without glandular dissection by radiological treatment only and of these 29 cases three only developed metastases.

From statistical data from Radiumhemmet as well as others available pertaining to this question it would seem clear, therefore, that a radical surgical operation of the glandular region in group I does not improve the prognosis. The glandular area should instead be given a prophylactic radiological treatment either by radium at a distance or by deep roentgen treatment in several series. According to some authors this radiological treatment exercises not only a destructive influence upon cancerous metastases of smaller size but has in addition a stimulating effect on the lymphatic tissues. The radiological treatment, therefore, should be prescribed immediately after the operation or the radium treatment of the primary tumour.

The patients should in addition be kept under strict observation during the next 6—8 months after the treatment in connection with the then proceeding post-operative radiological treatment and a radical block dissection of the glands at once be undertaken as soon as symptoms arise of commencing metastases.

In cases where it may be assumed that the resistance of the glandular apparatus has from some reason or another become lowered, caution seems to demand another line to be followed.

Such cases must be considered present in somewhat larger tumours of the tongue situated nearer the posterior part of the tongue, particularly if ulcerated and infected. In these cases it is probably safe to assume a secondary infection of the glands and thereby a lowered reactionary capacity. This condition also applies to tumours, where electro-endothermy or radium treatment, if adopted, gives rise to a stronger reaction with more extensive necrotic formations and consequent possibilities for secondary infection of the glands. I also believe regard must be taken to the duration of symptoms before the commencement of treatment. With the symptoms having lasted longer than 6—8 months it seems to me that the risk of metastases rapidly occurring during the time of reaction is rather great. In such cases I have myself seen rapidly growing glandular metastases arising very shortly after the treatment of a primary tumour.

In these cases it is probably best to give a pre-operative treatment by distant radium of the glandular area as well as the primary tumour. As soon as this treatment has been concluded the glandular region should be dissected in connection with electro-endothermy of the primary tumour. After healing of the wound post-operative radium treatment, locally as well as perhaps of the glandular area, should be undertaken.

Stage II

Conditions for treatment

To this stage belong those cases where clinically definite glandular metastases are at hand but where the cancer is as yet clinically localised to the gland. On palpation one does not then feel the usual soft movable glands but obviously harder and enlarged glands without any marked tenderness. Clinically it is difficult to differentiate them from enlarged glands irritated through inflammation, so common in affections of the mouth, and it has been shown by Simmons, as already mentioned, that the mistaken diagnoses may reach as much as 50 per cent (page 509). A definite classification of a case to stage II can

only be done after a detailed microscopical examination of the extirpated glands.

As soon as a tumour of the mouth has led to the formation of metastases the tumour can no longer be considered localised but the beginning has then been made to its generalisation, whether this dissemination has occurred *per continuitatem* or *per emboliam*. The treatment then becomes much more complicated. Some authors maintain that every local method of treatment already in this early stage of dissemination is a priori bound to fail. SIMMONS thus states that it is unsuitable trying to heal a case with clinically enlarged glands in the neck by radical operation and that the attempts made yield bad results. Other authors are of the opinion that safety lies in as radical and extensive operations as possibly.

It may probably be taken for granted at the outset that the glandular apparatus in most cases quite early in the development of metastases must, in the main, have lost its value as a bar to the spread of cancer, and that it is necessary to remove these metastases in some way or another. The methods and technique for this treatment, however, has been subject to lengthy discussions, and still to-day we find ourselves searching and questioning before this therapeutical problem.

The reason of this is partly to be found in our experience of the effect of the methods employed being too split up and incomplete, the material being relatively small and divided between several clinics, but also individually exceedingly variable, enabling one case to be only with difficulty compared with another. The difference in the material and the different ways in which even the same method of treatment is carried out render it also impossible to compare the statistics from different clinics. The reason is also partly to be found in the fact that the material is incompletely prepared and published with incomplete initial data, being therefore unsuited for objective scientific estimation.

Glandular metastases may either be treated by radical surgical extirpation, by radiological treatment only or by these two methods combined. REGAUD has published the one-year results of the treatment of metastases by different methods in 86 cases of cancer, table XVII, from which it will clearly be seen how prognostically unfavourable and how difficult to treat the metastases are.

Roentgen treatment

All workers are agreed that poor results are obtained from treating already developed glandular metastases by roentgen. REGAUD has had one case rendered free from symptoms out of 17 and among the

Table XVII

REGAUD's *results from treatment of 86 cases of glandular metastases with different methods*

Method of treatment	Number of cases	Free from symptoms 1 year or more	Unaffected
Roentgen treatment only	17	1	16
Dissection	8	2	6
Intubation with radium needles	19	1	18
Intubation with emanation capillary tubes	2	0	2
Radium treatment at a distance	21	10	11
Roentgen treatment + intubation	9	1	8
Dissection + post-operative roentgen treatment	1	0	1
Dissection + radium intubation + roentgen treatment	1	0	1
Dissection + radium intubation	4	0	4
Dissection + radium treatment at a distance	2	0	2
Radium intubation + radium treatment at a distance	2	0	2
Total	86	15	71

cases at Radiumhemmet there is no single case belonging to group II rendered permanently free from symptoms by roentgen. Of SIMMON's 108 cases with metastatic glands no one lived after three years. The German statistics give the same disencouraging results. Roentgen treatment technically carried out at present only seems capable of producing shrinkage of the glands for some longer or shorter period of time with subsequent palliation. The metastases later begin to grow again in spite of roentgen treatment then undertaken.

Radium treatment

Better results seem to be obtained by radium. This treatment is carried out either by radium at a distance of 3—5—10 cm. or by intubation of radium needles with filtered radiation or by glass capillaries with emanation in the metastases.

In REGAUD's material nearly half the number of patients have been rendered free from symptoms for a period of one year. QUICK also favours »distant» radium treatment followed by intubation of the glandular area by emanation capillary tubes, often in connection with some surgical operation, more or less extensive, thus a combination

of radiology and conservative surgery. At Radiumhemmet we have in recent years utilised the distant radium treatment and thereby obtained results which we have been unable to attain by roentgen treatment, but it is as yet too early to express any opinion as regards the permanent results of this treatment. On the whole, there is no statistics yet published of the results of treatment by radium only of glandular metastases from the mouth which makes it possible to estimate 3- and 5-years recoveries.

Surgical treatment

The best results that can apparently be obtained by surgical treatment of already developed metastases seem to be 10—15 per cent recoveries after 3—5 years. HÄGGSTRÖM's Swedish statistics with 15 operated cases of lingual cancer show two cases free from symptoms, or 13 per cent. The Mayo Clinic has reached 10 per cent recoveries after five years, probably, however, in combination with post-operative radiological treatment, EHRLICH 12 per cent and FRIEDEL 15 per cent recoveries after three years. (Table XV, p. 514.)

It may probably be assumed that the surgical technique for removal of metastatic glands has reached such a perfection as to render it impossible to attain any very much better results through still more refined technique.

Combined surgical and radiological treatment

The fact being therefore, that roentgen treatment, with its present technique, gives no favourable results in already developed glandular metastases, that treatment by radium seems to give relatively good preliminary results and the surgical treatment reaching on the most 3- and 5-years recoveries in 10—15 per cent of the cases, it stands to reason that one should try a combination of the different methods.

In REGAUD's table, it is true, all the combined methods seem to have given bad results, but QUICK, who has mostly employed the combined treatment and developed the technique of the combined conservative operation of the glandular areas with subsequent implantation of emanation capillary tubes, has at least obtained remarkably good preliminary results, having published statistical data on 58 cases, in 44 per cent of which he obtained freedom of symptoms for one year. I have been unable to come across any data in the literature showing healing for any longer periods of time and there is probably an intensive activity going on at present in order to develop this technique.

The cases of lingual cancer at Radiumhemmet are too few to allow of any conclusions on this subject. Of the three patients treated by a

combination of operation, roentgen and radium, one died in connection with the operation. One lived free from symptoms for four years but then developed right in the middle of the evacuated and treated area a recurrence of glands in which he died, while, finally, the third patient is still alive, eight years after the operation. All the six patients, again, who were admitted to Radiumhemmet with recurrences in the glandular region have been unaffected by the radiological treatment.

Were one to attempt drawing some conclusions from the results obtained at Radiumhemmet it may be said that some improvement in the results of the surgical evacuation might possibly be attained by combining this with pre-operative or immediately post-operative radiological treatment.

The following is the programme we follow at present in our treatment of glandular metastases of the neck.

1) Pre-operative treatment, preferably by radium at a distance.

2) Open operation with radical block dissection of glandular areas on both sides of the neck and in connection with the operation, if necessary, implantation of radium needles (or emanation capillary tubes) in the field of operation.

3) Post-operative treatment by radium at a distance or by roentgen.

With regard to the pre-operative treatment opinions are much at variance as to whether one single application or a series of applications should be given, immediately followed by the operation, or whether the reaction should be allowed completely to abate before the operation is undertaken, and further whether several series of pre-operative treatments should be given, terminated by operation of the remains of the glands. QUICK advocates repeated pre-operative applications as long as the glands diminish in size and lays stress more on these treatments than the post-operative radiological treatment. His view on the matter he states in the following expressive words: »I think that it is at once evident that post-operative radiation in a field where all the tissue structures, particularly the blood-supply, has been materially altered offers little benefit other than mental relief to the mind of the operating surgeon, who is unwilling to wait for adequate radiation before operating.»

On the opposite side we have a number of surgeons who emphasize the difficulties of operation after prolonged previous radiological treatment.

With regard to the question when dissection of the glandular areas should be done opinions differ. Some authors, such as KÜTTNER, EHRLICH, PROUST and MALLET, JUDD and NEW, maintain that the glandular

dissection should be done prior to the treatment of the primary tumour, as the operation is then done under aseptic conditions. SIMMONS admits that theoretically glandular dissection should precede the treatment of the primary tumour but he has found that some post-operative complication after the glandular dissection may frequently render it necessary to postpone the treatment of the primary tumour for some longer time and he therefore always operates on the primary tumour first. MILLIGAN maintains that the glands serve as a barrier to an eventual dissemination from the primary tumour and that therefore it is theoretically erroneous to extirpate the glands before the tumour has been treated. The authors in the first group consider it best to undertake, if possible, dissection of the glands and excision of the primary tumour at the same séance but most of them maintain that this is as a rule too big an operation and that it therefore should be divided in two or three séances. Under such circumstances excision of the primary tumour can then as a rule not be done until 7—10 days after removing of the glands.

Stage III

Regarding the treatment of inoperable tumours, on the other hand, opinions would seem to be exceedingly unanimous. Every attempt at surgical interference is only likely to considerably aggravate the condition of the patient, as well as every radiological therapy of more aggresive nature. It is probably advisable here to restrict one's measures to a careful absorbent radiological treatment whereby troublesome symptoms may be diminished and the patients afforded some palliation.

With increasing experience of the possibilities of attaining permanent recoveries after surgical operations or after surgical intervention combined with radiological treatment there cannot be much doubt, however, that cases intended for some elaborate operation will be subjected in future to a more and more severe sifting with the result that only early and well operable cases will be operated upon, while those cases showing the least sign of a commencing fixation, will be left for exclusively radiological treatment. In perusing operative statistics one also finds that the percentage of operated cases becomes more and more reduced. In operation statistics of older date one is dealing about operability figures of 65—70 per cent. NYSTRÖM's Swedish statistics, 1911—1913, includes 58 per cent operated cases and HÄGGSTRÖM's statistics, 1916—1921, 85 per cent operations. In the material of the Mayo Clinic including 303 patients 118 or 40 per cent were operated upon and JUDD and NEW emphasize the importance of narrowing the indications for operation.

No benifit is obtained by undertaking extensive operations in cases of doubtful operability, as the recurrences generally arise very rapidly and take a very malignant course. It is better in these cases to transfer them without operation to radiological treatment by which palliation can in most cases be attained for a considerable time. The great majority of patients, that at the present time are sent for radiological treatment, are in a very bad general state of health with markedly reduced general as well as local reactionary capacity, being thus unable to stand the radiological treatment. Were the doubtfully operable cases, instead of being subjected to operation, sent for radiological treatment before their general condition was too much impaired, the prospect of attaining a better result from such treatment would be much more favourable.

The risk of incomplete operations upon malignant tumours

The idea that the malignancy of a tumour, sarcoma in particular, would increase by interferences of different kinds, such as incisions, test excisions and incomplete extirpation, at first found support only from occasional communications on clinical cases but has gradually been placed on more scientific foundation.

On this question SEITZ and WINTZ take up a definite position in that they consider operative interference on a sarcoma to be contraindicated if radiological treatment is to be undertaken. The danger of opening up blood-vessels and lymphatic channels and thereby letting out sarcomatous cells into the general system is eminent. Similar views are held by KIENBÖCK, KARL BECK, RAPP, WERNER and others.

HOLFELDER has shown the risks of incisions for settling the diagnosis. In 28 cases of sarcoma, treated radiologically, test excisions were done in half the number of cases. Of these 14 cases two only are alive while of the 14 cases on which no test excisions were done six are alive. This author advises against every test excision and incomplete operation as the prospect of recovery is very much diminished through such interferences. JÜNGLING is of contrary opinion but admits, however, that there are cases, particularly of sarcomatous nature, in which in the patient's interest the diagnosis is better left open rather than some surgical measure being undertaken which may aggravate the prognosis.

MATTHEWS and BANE are likewise of the opinion that surgical interferences very largely aggravate the prognosis. I have had a couple of cases that support this contention.

A man, aged 22, in perfect health, had noticed for about two months that his right tonsil had slowly increased in size, without causing any trouble or showing any inflammatory symptoms, until it reached the uvula. It was

looked upon as a chronic tonsillitis and tonsillectomy was performed without subsequent microscopic examination or radiological treatment. After three months typical metastatic pains set in and roentgenological examination showed an extensive sarcomatosis in the bony system and death followed after three months.

A girl, aged 17, always previously in good health, developed headache of relatively acute onset, pains extending up over the skull. On examination she was found to have a tumour in the right nostril, from which a test excision was made. Patient was subsequently sent for radiological treatment under the diagnosis of sarcoma; there was a satisfactory result from the treatment so far as the primary tumour was concerned but four months later pains set in indicating skeletal metastases. On roentgen examination extensive sarcomatous metastases were indeed found and the patient died in diffuse sarcomatosis within half a year from the commencement of treatment.

The occurrence of such diffuse sarcomatous metastases in the skeleton is commonly very rare and the possibility of the rapid dissemination having been connected with the bloody interference cannot be entirely excluded.

It is of no infrequent occurrence that a test excision of suspected glandular metastases is so made that one gland in the conglomeration of them is extirpated. At this excision lymph- and blood-channels must necessarily be opened up right in the middle of tumorous tissue and I have repeatedly observed a rapid increase of movable metastases after such a performance leading to complete inoperability. The following instance is a case in point.

Man, aged 44, previously in good health. Without having any troublesome local symptoms he noticed a small gland in the right side of the neck. He consulted a doctor who prescribed potassium iodide and hot fomentations. In spite of this treatment, however, the gland continued to grow and for settling the diagnosis a test excision was then made of a freshly arisen gland of smaller size. The outcome of the microscopical examination was »sarcoma»? After this excision there was such a rapid increase of the metastatic glands that their growth could be observed day by day. On admission to Radiumhemmet some week or so after the test excision there was already a metastatic formation on the neck as large as a fist and immovably adherent to surrounding tissues. On examination the right tonsil was found to be the seat of changes, characteristic of sarcoma.

A woman, aged 50, who had been troubled now and then with catarrh of the throat, but otherwise been well, developed in connection with influenza a few small glands in the neck, the nature of which was uncertain. They were treated as septic lymphadenitis but as they nevertheless continued to grow, a test excision was made of one of them. The microscopic diagnosis was undifferentiated cancer. After this excision the glands increased rapidly in size and when the patient was admitted to Radiumhemmet some month or so after the operation there was a coherent »block» of glands on the neck almost as large as the palm of the hand. The primary tumour was found to be a relatively small cancer in the nasopharynx.

In consequence of the dangers associated with the test excision some authors warn against this, maintaining the clinical examination to be the most important means for settling the diagnosis and that a clinical diagnosis of malignant tumour is sufficient. Other authors are of the opinion that a case cannot be judged as malignant unless the diagnosis has been microscopically verified, and that every scientific estimation of the results of radio-therapy is impossible unless the patho-anatomical diagnosis is available.

Regarding the value of the microscopical diagnosis it must be emphasized that this is only decisive in case of positive findings. A microscopical diagnosis of negative nature does not allow any definite conclusion to be drawn as regards the malignancy of the tumour. The reason of this is clear. The pathologist is frequently given small pieces insufficient for obtaining a proper general view. It becomes impossible then to decide whether malignancy is present or not. In the mouth there are often additional inflammatory processes and atypical epithelial proliferations contributing to the difficulty of the diagnosis. The following cases are only a few odd instances in illustration of this fact.

A man, aged 29, had had pains in his throat for two months. In the posterior part of the soft palate a necrotic tumour and extensive glandular enlargements. The excised piece for microscopical diagnosis only showed an inflammatory process without any specific character. Wassermann negative. Antiluetic treatment afforded a temporary improvement for six months after which the condition was rapidly aggravated. A fresh test excision was then made from the primary tumour as well as from the glands and the diagnosis made of sarcoma (BERGSTRAND).

Woman, aged 63, with a tumour as large as a walnut in one of the tonsils, from which test excision was made. The pathological report was as follows: »Sarcoma suspected; the type of cell, however, does not differ so much from that present in the partly intact lymphoid tissue as to make it unlikely to be the result of purely inflammatory hyperplasia of this, the specimen not permitting of complete orientation and no clinical data being submitted. As evidence against sarcoma may perhaps be mentioned that the mucous membrane passes over part of the excised portion without infiltration. Microscopical diagnosis: Sarcoma (VESTBERG).» Expectant treatment was adopted and patient was admitted after six weeks for radiological treatment with an enormous primary tumour and large metastases and died after the course of five days.

Woman, aged 42, complained of her throat and was admitted to Radiumhemmet after the course of a month. The right tonsil was replaced by an ulcerating cavity with the bottom breaking down. The microscopical diagnosis was made of chronic inflammatory tissue with epithelial proliferations. Cancer suspected but no clear signs of it (REUTERWALL). Patient was given antiluetic treatment, Wassermann being strongly positive; temporary improvement followed but later again a sudden aggravation. After five months a

fresh extensive test excision was carried out and this time the microscopical diagnosis was: Undoubtedly cancer (REUTERWALL).

Radiological treatment was now commenced, five months after admission of the patient. The patient is still alive free from symptoms but the causal treatment was considerably delayed because of our unwillingness to treat her on the strength only of the clinical diagnosis of cancer.

Man, aged 50, with a papillomatous, cauliflower-like tumour in the sublingual region. Test excision for microscopical examination showed a papilloma without any definite histological evidence of malignancy. The patient was treated, however, for malignant tumour and became locally free from symptoms but after six months a gland appeared. Evacuation was done and the gland was found to be a typical cancroid metastatic formation.

These instances go to show that the uncertain and negative diagnosis does not exclude the presence of malignancy and that the main regard must therefore be taken to the clinical diagnosis.

At Radiumhemmet test excisions are made for microscopical examination in all cases where it is considered not to entail any risks for the prognosis. In order to lessen the dangers associated with the test excision we proceed as follows. The specimens are taken in the form of a slice-shaped piece sufficiently large for the pathologist to get a good view of surrounding intact tissue and mucous membrane and sufficiently deep to allow judgment to be made as to the presence of any infiltrative growth. Small test excisions, by means of, for example, a choncotome, from the surface of the tumour are quite useless. In taking a suitable and sufficiently large part of the tumour for microscopical examination it is impossible to avoid entering into surrounding healthy tissue and opening up blood-vessels and lymph-spaces. To reduce the dangers of this procedure the excision should always be done with a knife-electrode or after previous superficial electro-endothermy of the tumour and adjacent surroundings. In some tissues, for example lymphosarcomata, the finer structure becomes destroyed by the heat of the endothermy and if a microscopical examination is considered necessary here, an ordinary knife should therefore be used for the excision. In immediate connection with this endothermy is then first of all to be done of the excised area to a depth of a few millimetres and subsequently the treatment by radium or roentgen should be directly done in connection with the excision.

To carry out the radiological treatment in immediate connection with a test excision is a matter of very great importance for the prognosis as evidenced by my material of tonsillar sarcomata. In the majority of these cases the treatment was almost immediately connected with tonsillotomy or tonsillectomy and the healing results are very good; in one case, however, where the radiological treatment had been delayed for six weeks a rapid progression of the condition

had taken place and the case was hopeless already on admission. In four patients, in whom repeated incisions had been done for diagnostic purpose, the radiological treatment was considerably delayed and one patient only was rendered free from symptoms.

The test excision, the sending of the specimen to the pathologist, transference of the patient for radiological treatment, after the microscopical diagnosis has been settled, all these factors often cause a considerable time to elapse from the time of excision to the time when the patient appears for treatment.

I have several times seen tumours which on the patient's admission to Radiumhemmet have been twice and three times the size of the tumour as stated in the original report. The increase in size has taken place in the short time of three, on the most four weeks.

If a case, therefore, presents such clinical symptoms as to give sufficient indications for assuming malignancy, the best procedure is probably to send the patient directly for radiological treatment without any previous excisions for microscopical diagnosis.

Comparison between surgical and radiological results

In table XVIII I have made a joint tabulation of the results from Radiumhemmet and those presented in HÄGGSTRÖM's tabulation of cases, treated purely surgically, from Swedish Hospitals 1916—1921. For the sake of comparison I have then included only the operable cases from Radiumhemmet, treated solely radiologically and such operated cases which have been treated pre-operatively or post-operatively by radium or roentgen with the purpose of preventing recurrences. On the other hand, those cases have not been included for comparison, sent to Radiumhemmet for treatment of recurrences arisen after operation.

I. In early cases of cancer of the mouth with the primary tumour well limited without glands solely radiological treatment seems to give the same result as excision of the tumour by knife or knife-electrode, followed by post-operative radiological treatment to prevent recurrences. The method leading most rapidly to the goal, being easiest carried out and which, especially in buccal cancer, gives the best results, is electro-endothermy, in suitable cases combined with post-operative local treatment by radium.

Cancer of the tonsils and tonsillar sarcoma are probably best treated non-surgically by radiological methods only.

The glandular regions in these early cases seem to be best treated by systematic post-operative radiological treatment, except in certain exceptional cases, as in infected tumours or in cases of prolonged du-

Table XVIII

Joint tabulation of the results from radiological treatment only and combined treatment (Radiumhemmet's statistics) and the results from purely surgical treatment at Swedish hospitals 1916—1921 (Häggström's statistics)

Localisation of tumour	Group	Cases 1916—1925		Cases 1916—1923		Cases 1916—1921	
		Number of cases	Free from symptoms 1 year or more	Number of cases	Free from symptoms 3 years or more	Number of cases	Free from symptoms 5 years or more
Lingual cancer							
Radiumhemmet	I—II	41	29 (71 %)	31	22 (71 %)	22	13 (59 %)
Häggström	I—II					37	11 (30 %)
Sublingual cancer							
Radiumhemmet	I—II	15	11 (73 %)	10	8 (80 %)	6	5 (83 %)
Häggström	I—II					3	2 (67 %)
Mandibular cancer							
Radiumhemmet	I—II	21	11 (52 %)	15	7 (47 %)	8	3 (38 %)
Häggström	I—II					9	3 (33 %)
Buccal cancer							
Radiumhemmet	I—II	28	14 (50 %)	19	10 (53 %)	2	1 (50 %)
Häggström	I—II					15	4 (27 %)
Tonsillar cancer							
Radiumhemmet			Palliative results only				
Tonsillar sarcoma							
Radiumhemmet	I—II	32	14 (44 %)	24	9 (38 %)	21	6 (29 %)

ration before treatment, when an early dissection of the glands may be considered indicated.

It is necessary to keep these patients under careful observation.

II. In more extensive well operable tumours the best results seem to be obtained by a combination of pre-operative radiological treatment with operation followed by radiological treatment; these results are superior than those obtained by purely surgical measures.

Movable well operable glandular metastases should be subjected to radical block-dissection in connection with radiological treatment.

III. More extensive tumours and metastases showing a commencing fixation should not be subjected to primarily surgical treatment. There is no room for the palliative operation in the treatment of tumours

of the mouth and their metastases. Tumours in this stage seem best treated exclusively radiologically.

IV. With the present radiological methods of treatment it seems as if in cases of inoperable tumours and extensive metastases, with few exceptions, only palliation of longer or shorter duration could be obtained.

SUMMARY

The author has collected those cases of malignant tumours of the tongue and the sublingual, mandibular, buccal and tonsillar regions treated at Radiumhemmet during the last few decades.

For each locality the material has been divided into four different sections. Section A comprises those cases operable on admission to Radiumhemmet and only radiologically treated. To section B those cases belong who have obtained a combined surgical and radiological treatment, the patient either being given pre-operative radiological treatment and subsequently operated upon or given immediate post-operative radiological treatment to prevent recurrences after previous operation. Section C comprises those cases having undergone operation but who have only obtained radiological treatment after development of recurrences either locally or in the glandular region. Section D includes inoperable cases treated by radiotherapy only.

Each of these four sections has been divided into groups according to the presence or not of glandular metastases, group I including those cases where no clinically demonstrable metastases could be found at the operation or on admission to Radiumhemmet, and group II cases with definite clinical evidence of glandular metastases.

This classification into sections and groups has been done on account of the great variation occurring in prognosis as well as treatment.

The results of treatment are briefly as follows:

Cancer of the tongue (Tab. I—II). In section A 64 % are free from symptoms for three years, 60 % for five years. In section B I 77 % are free from symptoms for three years and 60 % for five years. In B II 67 % are free from symptoms for three years and 50 % for five years. In section C I 43 % are free from symptoms for three and five years. I section C II no case has survived one year. Of the inoperable cases, section D, one case only has survived five years.

Cancer of the sublingual region (Tab. V—VI). In section A 50 % are free from symptoms for three years and 100 % for five years. In section B I 100 % are free from symptoms for three years and 60 % for five years. In Section B II 100 % are free from symptoms for three years. In section C and D no case has survived three years.

Mandibular cancer (Tab. VII—VIII). In section A 50 % are free from symptoms for three years and 25 % for five years. In section B I 50 % are free from symptoms for three and five years. In B II 43 % are free from symptoms for three years and 50 % for five years. In section C no case survived one year and in section D one case only survived three years.

Buccal Cancer (Tab. IX—X). Of operable and inoperable cases, treated radiologically only, 45 % are free from symptoms for three years and 35 % for

five years. In section B I 90 % are free from symptoms for three years and 100 % five years. In section B II only 11 % are free from symptoms for three years and no case for five years. In section C I 20 % only have survived three and five years. In C II no case has survived one year.

Cancer of the tonsil (Tab. XI). In this section only palliative results have been obtained with temporary freedom from symptoms from one to four years.

Sarcoma of the tongue. (Tab. XII—XIII.) In section A I 60 % are free from symptoms for three and five years and in section A II 32 % are free from symptoms for three years and 19 % for five years.

The percentage figures are given with due reservation for the small number of cases.

A detailed account is given of the *origin and development of the glandular metastases as well as their bearing on the prognosis.* From the point of view of technique of the treatment the author divides his cases into three different stages. For stage I, comprising cases without clinically demonstrable metastases, the author advises radiological treatment only. *The author shows that the results of radical surgical dissection of the glandular regions in these early cases are no better than those obtained by only radiological treatment. For stage II, comprising cases with already developed but definitely operable metastases the author recommends pre-operative treatment with radium at a distance, followed by block dissection of the glandular regions on both sides of the neck if necessary with subsequent post-operative radiological treatment. For stage III, cases on the border-line between operability and inoperability, the author advises against attempting surgical interference and recommends radiological treatment only.*

The risk of incomplete operations of malignant tumours is elucidated by the author, cases from the literature and his own cases being submitted in illustration.

Test excisions should be done only by the method of electro-endothermy and in immediate connection with the radiological treatment.

Finally, in tab. XVIII, page 529, the author gives a comparable tabulation of the results obtained by surgical treatment alone and by radiological or combined surgical and radiological treatment.

ZUSAMMENFASSUNG

Verf. hat die Fälle von malignen Tumoren in Zunge, Regio sublingualis, Mandibula, Bucca und Tonsillen zusammengestellt, die in den letzten Jahrzehnten im Radiumhemmet behandelt wurden.

Für jede der verschiedenen Tumorlokalisationen wurde das Material in vier verschiedene Abteilungen eingeteilt. Zur Abteilung A wurden die Fälle gerechnet, die bei der Aufnahme ins Radiumhemmet operabel waren und nur radiologische Behandlung erhielten. In die Abteilung B wurden alle Fälle eingereiht, die eine kombinierte, chirurgische und radiologische Behandlung erhielten, indem man der Operation entweder eine präoperative radiologische Behandlung vorausschickte oder der Operation unmittelbar eine postoperative radiologische Behandlung zur Verhütung von Rezidiven folgen liess. Zur Abteilung C wurden die Fälle gerechnet, die operiert worden waren, aber erst zur radiologischen Behandlung kamen, nachdem sich Rezidiven, entweder lokal oder in der Drüsenregion entwickelt hatten. In der Abteilung D sind die Fälle zusammengestellt, die nur radiologisch behandelt wurden.

In jeder dieser 4 Abteilungen ist eine Aufteilung der Fälle im Hinblick auf das Vorhandensein von Drüsenmetastasen vorgenommen worden. Und zwar umfasst Gruppe I die Fälle die bei der Operation oder Aufnahme ins Radiumhemmet keine klinisch nachweisbaren Drüsenmetastasen aufwiesen. Gruppe II umfasst die Fälle, in denen klinisch sichere Drüsenmetastasen vorgefunden wurden.

Diese Aufteilung in verschiedene Abteilungen und Gruppen wurde vorgenommen, weil sowohl die Prognose wie die Behandlung sehr verschieden sind.

Die Behandlungsresultate sind in Kürze folgende:

Cancer linguae (Tab. I—II). In Abteilung A sind 64 % durch 3 Jahre symptomfrei, und 60 % durch 5 Jahre. In Abt. B I sind 77 % 3 Jahre lang und 60 % 5 Jahre lang symptomfrei. In Abt. B II 67 % 3 Jahre lang symptomfrei, und 50 % 5 Jahre lang. In Abt. C I 43 % 3 und 5 Jahre symptomfrei. In Abt. C II hat kein Fall ein Jahr überlebt. Von den inoperabeln Fällen, Abt. D, hat nur 1 Fall 5 Jahre überlebt.

Cancer regionis sublingualis (Tab. V—VI). In Abt. A sind 50 % 3 Jahre lang symptomfrei, und 100 % 5 Jahre. In Abt. B I 100 % 3 Jahre lang symptomfrei, und 60 % 5 Jahre lang. In Abt. B II 100 % 3 Jahre lang symptomfrei. In Abt. C und D hat kein Fall 3 Jahre überlebt.

Cancer mandibulae (Tab. VII—VIII). In Abt A sind 50 % 3 Jahre lang symptomfrei und 25 % 5 Jahre lang. In Abt. B I 50 % 3 und 5 Jahre lang symptomfrei. In Abt. B II sind 43 % 3 Jahre lang symptomfrei, und 50 % 5 Jahre lang. In Abt. C hat kein Fall 1 Jahr überlebt und in Abt. D hat nur ein Fall 3 Jahre überlebt.

Cancer buccae (Tab. IX—X). Von operabeln und inoperabeln nur radiologisch behandelten Fällen sind 45 % 3 Jahre lang symptomfrei, und 35 % 5 Jahre. In Abt. B I 90 % 3 Jahre symptomfrei und 100 % 5 Jahre. In Abt. B II nur 11 % 3 Jahre lang symptomfrei, und kein Fall 5 Jahre lang. In Abt. C I haben nur 20 % 3 und 5 Jahre überlebt. In Abt. C II hat kein Fall 1 Jahr überlebt.

Cancer tonsillae (Tab. XI). Nur palliative Resultate mit temporärer Symptomfreiheit von 1 bis 4 Jahren.

Sarcoma linguae (Tab. XII—XIII). In Abteilung A I sind 60 % 3 und 5 Jahre lang symptomfrei, in Abt. II A 32 % 3 Jahre lang, und 19 % 5 Jahre lang.

Die Prozentziffern werden in Anbetracht der geringen Anzahl der Fälle unter Vorbehalt angegeben.

Es folgt ein eingehender Bericht über *die Entstehung und Entwicklung von Drüsenmetastasen sowie über ihre Bedeutung für die Prognose.* Für die Behandlungstechnik teilt Verf. seine Fälle in 3 verschiedene Stadien ein. Für das Stadium I, das Fälle ohne klinisch nachweisbare Drüsenmetastasen umfasst, wird ausschliesslich radiologische Behandlung empfohlen. *Verf. zeigt, dass die Resultate radikaler chirurgischer Ausräumung der Drüsenregionen bei diesen frühen Fällen nicht besser sind als die einer ausschliesslich radiologischen Behandlung. Für das Stadium II, das Fälle mit schon entwickelten, aber gut operablen Drüsenmetastasen umfasst, empfiehlt der Verf. eine präoperative Behandlung mit Radium auf Distanz, gefolgt von radikaler Ausräumung der Drüsenregionen, ev. auf beiden Seiten des Halses und nachheriger postoperativer radiologischer Behandlung. Für das Stadium III, das*

die Fälle an der Grenze zwischen Operabilität und Inoperabilität umfasst, rät Verf. vom Versuch chirurgischer Eingriffe ab und empfiehlt ausschliesslich radiologisehe Behandlung.

Das Risiko unvollständiger Eingriffe an malignen Tumoren wird vom Verf. durch Fälle aus der Literatur und eigene Fälle illustriert.

Probeexzisionen sollen nur mit der Elektroendothermiemethode und im unmittelbaren Anschluss an die radiologische Behandlung vorgenommen werden.

In Tab. XVIII, Seite 529, gibt Verf. endlich eine vergleichende Zusammenstellung der Resultate, die durch ausschliesslich chirurgische, durch radiologische oder durch kombinierte chirurgische uud radiologische Behandlung gewonnen wurden.

RÉSUMÉ

L'auteur a réuni les cas de tumeurs malignes de la langue, de la région sublinguale, du maxillaire, de la bouche et des amygdales traités au «Radiumhemmet» au cours des dernières décades.

Dans leurs diverses localisations, ces cas ont été classés en quatre catégories différentes. Dans la catégorie A on a rangé les cas qui étaient opérables à leur entrée au «Radiumhemmet» et qui n'ont été soumis qu'à un traitement radiologique. La catégorie B comprend les cas ayant été l'objet d'un double traitement chirurgical et radiologique, en ce sens que le malade a subi, ou bien un traitement radiologique pré-opératoire suivi d'une intervention, ou bien un traitement opératoire préalable suivi d'un traitement radiologique postopératoire en vue de prévenir les récidives. Dans la catégorie C, on a classé les cas ayant subi une intervention chirurgicale et qui ne sont entrés au «Radiumhemmet» qu'après l'apparition d'une récidive locale ou ganglionnaire. Enfin la catégorie D comprend les cas inopérables chez lesquels le traitement a été exclusivement radiologique.

Dans chacune de ces catégories, le matériel clinique a été subdivisé en deux groupes, suivant la présence ou l'absence de métastases ganglionnaires. Le groupe I comprend les cas qui, au moment de l'opération ou à leur entrée au «Radiumhemmet», ne présentaient aucune métastase ganglionnaire cliniquement décelable. Le groupe II comprend les cas atteints de métastases ganglionnaires cliniquement certaines.

Ce classement en catégories et en groupes a été fait en raison de la différence notable qui existe entre ces divers cas, tant au point de vue du pronostic qu'à celui du traitement.

Les résultats du traitement sont en résumé les suivants:

Cancer de la langue (Tableaux I—II). Dans la catégorie A, 64 % des cas sont exempts de symptômes 3 ans et 60 % 5 ans après la fin du traitement. Dans la catégorie B (I), 77 % des cas sont restés exempts de symptômes pendant trois ans et 60 % pendant cinq ans. Dans la catégorie B (II), 67 % des cas ne présentent aucun symptôme pendant trois ans et 50 % pendant cinq ans. Dans la catégorie C (I), 43 % de cas exempts de symptômes pendant trois et cinq ans. Dans la catégorie C (II), aucun malade n'a survécu plus d'un an. Des cas inopérables (catégorie D), un seul a eu une survie supérieure à cinq ans.

Cancer de la région sublinguale (Tableaux V—VI.). Dans la catégorie A, 50 % des malades sont exempts de symptômes pendant trois ans et 100 %

pendant cinq ans. Dans B (I), 100 % des cas ne présentent aucun symptôme pendant trois ans et 60 % pendant cinq ans. B (II) donne 100 % de cas exempts de symptômes pendant trois ans. Dans les catégories C et D, aucun malade n'a survécu plus de trois ans.

Cancer du maxillaire (Tableaux VII—VIII.). Dans le catégorie A, absence de symptômes dans 50 % des cas pendant trois ans et 25 % pendant cinq ans. Dans la catégorie B (I), 50 % des cas sont exempts de symptômes pendant trois et cinq ans. B (II) présente 43 % de malades exempts de symptômes pendant trois ans et 50 % pendant cinq ans. Dans C, aucune survie supérieure à un an; Dans D, un seul malade a survécu plus de trois ans.

Cancer de la bouche (Tableaux IX—X.). Des cas inopérables ou opérables ayant subi un traitement exclusivement radiologique, 45 % restaient exempts de symptômes après trois ans et 35 % après cinq ans. Dans la catégorie B (I), on note 90 % de cas exempts de symptômes pendant trois ans et 100 % pendant cinq ans. Dans B (II), 11 % seulement des cas sont exempts de symptômes après trois ans et aucun après cinq ans. C (I) ne présente que 20 % de survie après trois et cinq ans. Dans C (II), aucun cas de survie après un an.

Cancer de l'amygdale (Tableau XI). On n'a obtenu que des résultats palliatifs, avec exemption partielle de symptômes d'un à trois ans.

Sarcome de la langue (Tableaux XII—XIII.). Dans A (I), 60 % des cas exempts de symptômes après trois et cinq ans. Dans A (II), 32 % de cas exempts de symptômes pendant trois ans et 19 % pendant cinq ans.

Ce pourcentage est donné sous toutes réserves, en raison du nombre restreint de cas observés.

L'auteur communique une étude détaillée *des métastases ganglionnaires, de leur origine, de leur développement et de leur signification au point de vue du pronostic.* Au point de vue de la technique thérapeutique, l'auteur classe ses cas suivant trois stades. Au stade I, comprenant les cas exempts de toute métastase ganglionnaire cliniquement décelable, il conseille un traitement exclusivement radiologique. Il démontre que *les résultats obtenus dans ces cas récents par un curage radical de la région ganglionnaire ne sont pas supérieurs à ceux que donne le seul traitement radiologique. Au stade II, où l'on observe des métastases déjà développées mais parfaitement opérables dans les ganglions, l'auteur conseille un traitement radiologique pré-opératoire à distance, suivi d'un curage radical et au besoin bilatérae de la région ganglionnaire, suivi à son tour d'un traitement radiologique postopératoire. Pour les cas du stade III. qui sont à la limite de l'opérabilité ou qui sont inopérables, l'auteur déconseille toute tentative d'intervention opératoire et préconise le seul traitement radiologique.*

En s'appuyant sur les cas publiés dans la littérature et sur ses cas personnels, *l'auteur fait ressortir les risques des interventions opératoires incomplètes.*

Des prélèvements biopsiques ne doivent être faits qu'avec la méthode électro-endothermique et en relations immédiates avec le traitement radiologique.

Enfin, l'auteur donne un compte-rendu synoptique et comparatif des résultats obtenus par le traitement chirurgical seul, par le traitement exclusivement radiologique et par une combinaison du traitement chirurgical et du traitement radiologique (P. 529).

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FROM THE RÖNTGEN DEPARTMENT OF THE MARIA HOSPITAL STOCKHOLM.
CHIEF: ÅKE ÅKERLUND, M. D.

LATER EXPERIENCES CONCERNING THE NICHE DIAGNOSIS IN CASES OF DUODENAL ULCER[1])

by

Åke Åkerlund

(Tabulæ XL—XLIV)

At the first meeting of the Northern Society of Medical Radiology in Oslo eight years ago I had the honour to submit a fairly detailed account of the röntgen diagnosis of duodenal ulcer, in the main in accord with the subject-matter of my treatise on the same theme, subsequently published. When I now again venture to take up the same question before the same audience I do it mainly to get an opportunity of emphasizing still further, on the strength of the practical experience since gained, the importance of a factor, which, though already then pointed out, seems to me to be still underrated, in this country as well as in other places: I am referring to the importance of *direct compression of the duodenal bulb* for demonstrating niches in that location.

As we all know direct compression of the bulb is intended largely to displace the opaque contents filling it up, so that the thin layer left behind can be forced into all nooks and corners of the bulb, in between folds of mucous membrane formed on compression, into pits, irregularities and recesses of all kinds, thereby giving us *an accurate relief picture of the walls of the incompletely distended bulb.* The normal relief of the mucous membrane in the bulb will be seen from a few compression pictures submitted (Fig. 1—4).

In the treatise referred to above (1921) the last page of the chapter on the technique of examination of the bulb was devoted to this very subject. I would now like to pick up the thread again and continue where I then ended.

From having used at first direct compression of the bulb only in more selected cases I have in recent years, more and more frequently, found it to be of invaluable service. For a long time now I have been using it as a *routine method at every bulb examination* and consider it an *essential adjunct* to the ordinary examination of

[1]) Paper read before the 5th meeting of the Northern Society of Medical Radiology. Copenhagen 1927.

the bulb. A röntgen examination of the bulb without subsequent direct compression must at the present time be considered incomplete.

I had the satisfaction of soon finding the suggested bulb compression warmly recommended by different workers, in the first place by E. ATTINGER in a paper under the heading: »*Die Röntgenuntersuchung des Bulbus duodeni mittels der Methode der dünnen Schicht*» (1925). A similar technique was also adopted by TESCHENDORF and HERRNHEISER but above all by HANS HEINRICH BERG; the latter has developed his technique to masterly perfection of which the numerous magnificent compression pictures in his excellent treatise (1926) on ulcus duodeni bear witness. The frequently decisive importance of the technique of compression was also emphasized by CARMAN in his last paper, dealing with the duodenal niche and published in the autumn of 1926 just before his death in co-operation with SUTHERLAND.

There is nothing much to be said about the *technique* of the direct compression of the bulb. The maxim should be here as elsewhere: the simpler the better. After having rendered the bulb as well filled as possible with the opaque substance, best done by manual manipulations after keeping the patient for a few minutes in a right-sided position, I first carry out a general survey of the bulbar region by manual palpation and compression and then I insert a small hard cotton-wool pad between the casette-holder and the patient in front of the region of the bulb. I generally have an assortment of pads of different sizes in order always to get the most suitable effect of the compression. In certain cases I have had great use of some especially shaped compressors made of thick cork, as well as cup-shaped, semi-spherical compressors of aluminium, fixed by a handle to the upper border of the casette-holder and from there adjusted to any desired position. To enable the degree of compression, the »dose» of compression, to be suited to the optimum requirements in each special case I have had the fixation arrangement of the casette-holder somewhat modified on FORSSELL's stand, so as to render it easily and conveniently secured in every desired position of compression.

The compression is in every case controlled under the screen to enable direct observation as to whether the pressure is of sufficient strength and correctly applied. In some cases compression straight from the front is to preferred, in others (the majority) a considerably better effect is obtained by applying the compression obliquely at different angles. Individualisation is the very essence of the examination.

In my opinion, therefore, it is of great importance so to arrange

it that the direction of compression is made independent of the direction of the röntgenological projection. Only under such circumstances can the best possible results be attained by this method and, from diagnostic point of view, the most valuable relief pictures be obtained. From this reason I think such arrangements less suitable for this purpose where the compression is carried out by means of a tube attached to the casette-holder and set in the direction of projection (as practised by BERG, TESCHENDORF and KLOIBER).

The complete filling of the bulb with opaque substance to a higher or lower degree of distension — for many an investigator the sole aim of the technique — should no longer be the goal but merely a necessary preliminary for carrying out the most important part of the examination, namely compression of the bulb. When the well-known picture of a well-filled bulb — like the figure heart or spade in cards — comes before us and when many observers — perhaps most of them — leave the bulb as normal, first at that moment does the most interesting and most profitable part of the whole examination begin for those who realise the enormous importance of direct compression of the bulb for demonstrating niches (cf. Fig. 5—6).

For further illustration of this point I would like to refer to a few pictures (Fig. 7—14). They are all serial pictures and in most of the series 3 out of 4 have been taken *with* full direct compression while the fourth has been taken for the sake of comparison with reduced compression. On the latter pictures with reduced compression the bulb has either a normal appearance or shows some small atypical deformity; on the compression pictures we find beautifully constant and often very small niche formations within the bulb shadow. Frequently (Fig. 7, 13, 15) we find a ridge surrounding the niche, occasioned by infiltration, oedema or merely contraction of the mucous membrane, other times (Fig. 14) folds of mucous membrane arranged in a starlike manner are seen to converge towards the niche. In certain cases (Fig. 15) two niches are seen close to one another, one belonging to the anterior wall and the other to the posterior bulbar wall, »contact ulcers», MOYNIHAN's »kissing ulcers».

In such pictures, where niches occur within an otherwise normally shaped bulb, there is generally a question of shallow, relatively superficial craters which promptly disappear during an ulcer-cure simultaneously with the symptoms. Several such cases, however, have been operated upon and even if the ulcer has not always been demonstrable from the outside of the bulb, it has always been found on the resected specimen being slit open.

It is not only in those cases, however, where the bulb has a relatively normal appearance from the start, that compression

plays an important part for the demonstration of niches. In a very great number of cases, with deformed bulbs, yet where there has been no visible contour-forming niche, it is only after compression that I have succeeded in demonstrating the niche itself within the bulb shadow, previously covered by bulbar parts filled with opaque substance and often the centre of a star-like arrangement of folds of mucous membrane.

Since constantly adopting the compression method in recent years the »en-face» niches or »relief-niches», ulcers on the anterior or posterior bulbar wall, have occurred much more frequently among my cases than formerly, whereas the so-called »classical» contour-forming niches on the lesser curvature with corresponding deep, spastic or organic incisuræ on the opposite side of the bulb, have become relatively more rare; the latter cases represented more than half the number of those related in my treatise referred to above.

The reduced frequency in recent years of this »classical» type of duodenal ulcer is, however, so obvious among my cases that, in my opinion, it is not only *relative* but also *absolute*. In this type of case it has probably been a question of mainly inveterate chronic ulcers which have been overlooked for a long time and are now on the point of disappearing at least from the big towns as a result of our diagnostic and therapeutic measures, in the same way as, for example, the large typical stomachal niches with segmental incisuræ, at the present time mainly met with among the more distant rural population.

By compression of the bulb I have been able to establish the presence of *multiple niches* in the bulb in a considerably greater proportion of cases than formerly. In illustration of this reference is made to Fig. 16—19. In multiple ulcers, however, it often happens that one of the ulcers is larger, deeper and of older date than the others and so to speak gives the character to the whole deformity; if in such a case the patient should have in addition a few small superficial ulcerations, it is of very insignificant import from diagnostic-therapeutic point of view. With plenty of time at one's disposal and if a greater number of serial pictures with varying compressions and projections can be taken without inconvenience, it is often possible with a little practice to detect three and even four niches. As I consider, as already mentioned, the establishing of the multiplicity itself to be of subordinate consequence it is only exceptionally that I have made a special point of this provided the diagnosis: niche-shaped duodenal ulcer, has been established.

In spite of the considerably reduced frequency of the »classical» large niches in the lesser curvature of the bulb the total number of

diagnosed niches in the bulb has — thanks to the technique of compression in particular — greatly increased every year. Whereas 8—10 years ago it took me two whole years to collect among a large number of hospital cases the 66 niche-cases related in my treatise, I see the same number now in the course of only a few months, drawn from very much similar material. For certain long periods, especially autumn and spring, I see one niche-shaped duodenal ulcer per day, on an average.

In this connection I cannot refrain from answering quite briefly the criticism levelled against my method of diagnosing duodenal niches a few years ago by Prof. P. CLAIRMONT [Zürich]. It may be added that this criticism has already been exhaustively and genuinely dealt with by other workers, in particular by BERG in Frankfurt.

Doubt was expressed by CLAIRMONT as to whether the röntgenological bulbar niches really corresponded to the ulcer-craters, maintaining that the former were mostly confined to the area of the lesser curvature and solitary, while the ulcers on patho-anatomical examination were only rarely localised to the lesser curvature itself but, on the other hand, most frequently multiple.

My answer to this is that in practically everyone of my exceedingly numerous cases of bulbar niches diagnosed röntgenologically and collected during close upon 10 years, where I have had the opportunity of examining the anatomical specimen, the bulbar niche has proved to correspond anatomically to a crateriform ulcer.

It would seem to be clear from the aforesaid in what way variations in material and technique of examination have a bearing on the demonstration of niches. In my *earlier* cases and with the technique then used the deep, callous, solitary craters in the lesser curvature with corresponding incisuræ were in the preponderance, in my *present* cases, on the other hand, in which compression is being practiced, the majority is made up of the more shallow, often multiple, »en-face» or »relief» niches on the anterior or posterior bulbar wall, a type, therefore, which is well in accord with CLAIRMONT's patho-anatomical material. Both these types of ulcer produce characteristic and definite niches, the former more spontaneously, the latter usually only on employing a special and more precise technique, that can be mastered by everyone with sufficient practice.

SUMMARY

1. The niche diagnosis in cases of duodenal ulcer has made great advances of late, thanks to the routine application of the technique — which, it is

true, has not yet been adopted everywhere — of direct bulb compression; a method which permits one to study closely the surface conformation of the bulbar wall.

2. The direct compression should be applied and graduated under screen control. The direction of the pressure should not be made dependent on that of the projection. The simplest way of compressing the bulbar area is by means of cotton-, cork- or aluminium pads, placed between the casette-holder and the patient.

3. The bulb compression not infrequently makes it possible to demonstrate small and superficial niche formations ("en-face-niches", "niches in relief") within the bulbs, which without compression appear roentgenologically entirely or almost normal.

4. The compression of a deformed bulb will often bring out the hitherto invisible niche, against which folds of the mucosa converge.

5. Niches on the anterior or posterior wall of the bulb ("niches in relief") are nowadays much more frequent than the so-called "classical" contour-forming niches on the lesser curvature side with corresponding deep incisuræ on the opposite side; a fact which is probably due as much to the altered technique as to different conditions in the material observed.

6. The compression method rather often makes it possible to demonstrate the existence of multiple ulcers.

7. Thanks to the compression method the demonstration of bulbar niches has become far more frequent than before even in exceedingly early stages. In practically every case, where it has been possible to check the findings by operation or autopsy, the niche roentgenologically diagnosed has proved anatomically to correspond with a crateriformed ulcer.

ZUSAMMENFASSUNG

1. Die Nischendiagnostik bei Ulcus duodeni hat in den letzteren Jahren neue, bedeutungsvolle Fortschritte gemacht, die durch eine konsequente Anwendung der leider noch nicht allgemein gebrauchten Technik direkter Bulbuskompression erreicht wurden, welche Technik ein genaues Studium des Reliefs der Bulbuswände ermöglicht.

2. Die direkte Kompression soll unter Durchleuchtungskontrolle angelegt und dosiert werden. Die Richtung des Druckes soll besser nicht von der Projektionsrichtung abhängig gemacht werden. Am einfachsten wird das Bulbusgebiet mittels Pelotten aus Watte, Kork oder Aluminium komprimiert, die zwischen dem Kassettenhalter und Patienten angebracht werden.

3. Durch die Bulbuskompression kann man nicht selten kleinere, oberflächliche Nischenbildungen (›en face-Nischen‹, ›Reliefnischen‹) in einem Bulbus nachweisen, der ohne Kompression röntgenologisch ein völlig oder nahezu normales Aussehen zeigt.

4. Bei Kompression deformierter Bulbi lassen sich oft vorher nicht sichtbare Nischen zur Anschauung bringen, gegen welche nicht selten Faltenbildungen der Mukosa von verschiedenen Seiten konvergieren.

5. Die Nischen auf der vorderen oder hinteren Wand des Bulbus (›Reliefnischen‹) findet man nunmehr bedeutend häufiger als die sog. ›klassischen‹ konturbildenden Curvatura-minor Nischen mit korrespondierender tiefer

Einziehung an der gegenüberliegenden Seite. Die Erklärung dieses Verhaltens ist anscheinend sowohl in der verbesserten Technik als in einer gewissen Veränderung des Materials zu suchen.

6. Mit der Kompressionsmethode glückt es relativ oft, multiple Geschwüre nachzuweisen.

7. Durch die Kompressionsmethode ist der Nachweis von Bulbusnischen unvergleichlich häufiger geworden als früher, auch für sehr frühe Fälle. So gut wie in jedem Falle, wo autoptische Kontrolle möglich war, hat es sich gezeigt, dass die röntgendiagnostizierte Nischenbildung einen Geschwürskrater als anatomische Grundlage hatte.

RÉSUMÉ

1. Le diagnostic des »niches» dans l'ulcère du duodénum a, au cours des dernières années, fait de grands progrès grâce à une application rationnelle de la méthode, malheureusement trop peu utilisée, de compression directe du bulbe, méthode qui permet une étude approfondie du relief des parois du bulbe.

2. La compression directe doit être appliquée et dosée sous le contrôle radioscopique. La direction de la compression doit, dans la plus large mesure possible, ne pas être subordonnée à la direction de la projection. Le procédé le plus simple pour effectuer la compression du bulbe consiste à recourir à des pelotes de coton, de liège ou d'aluminium, placées entre le malade et le porte-châssis.

3. La compression du bulbe permet assez souvent de déceler des formations en niche restreintes et superficielles (»niches de face», »niches en relief») au niveau du bulbe, formations qui, si l'on ne recourt pas à la compression, paraissent au point de vue radiologique, tout à fait ou à peu près normales.

4. La compression d'un bulbe déformé permet souvent de faire apparaître les niches elles-mêmes, sans cela invisibles, et vers lesquelles convergent fréquemment de tous côtés des plicatures.

5. Les niches des parois antérieure ou postérieure du bulbe, c.-à-d. les niches dites »en relief», se rencontrent actuellement d'une façon bien plus fréquente que les niches dites »classiques» formant contour et occupant la petite courbure, niches auxquelles correspondent de profondes incisures: l'explication de ce fait doit être cherchée, semble-t-il, dans une amélioration de la technique ainsi que dans une certaine modification subite par le matériel.

6. La méthode de compression permet assez souvent de découvrir des ulcères multiples.

7. Grâce à la compression du bulbe, on arrive, bien plus fréquemment que jadis, à déceler l'existence de niches du bulbe, même dans les cas tout à fait récents. Dans la presque totalité des cas où le contrôle nécropsique soit de fragments excisés, soit de préparations anatomo-pathologiques, a été possible, il a été constaté que les niches découvertes à l'examen röntgenologique avaient pour substratum anatomique des cratères ulcéreux.

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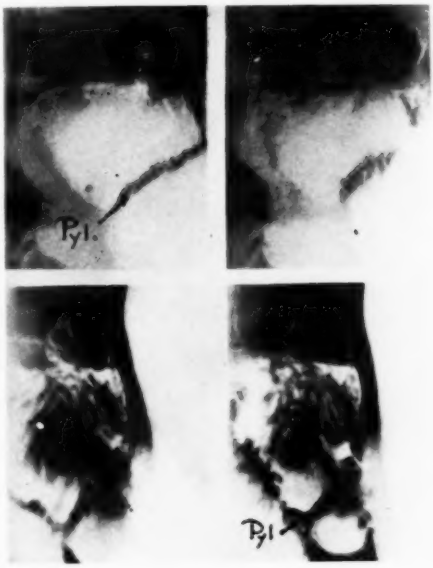
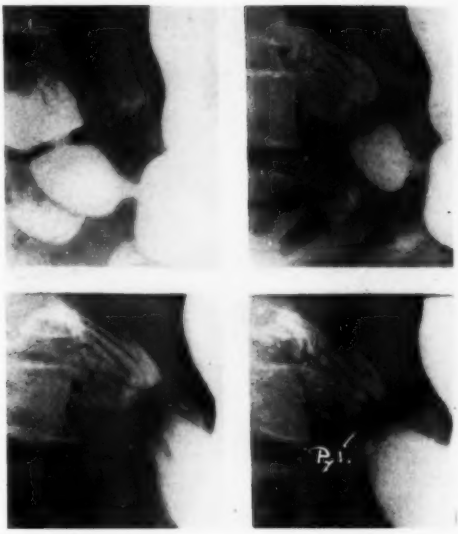


Fig. 1.



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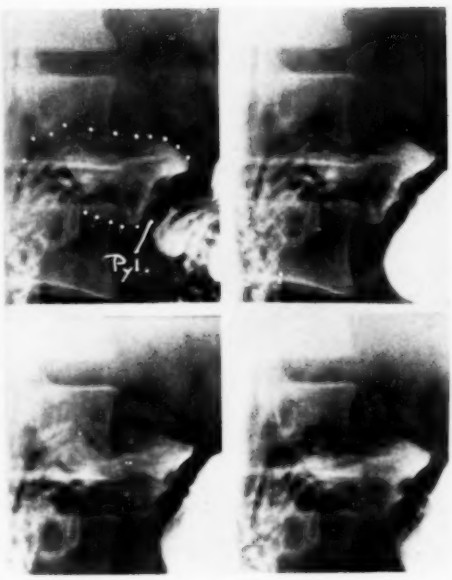

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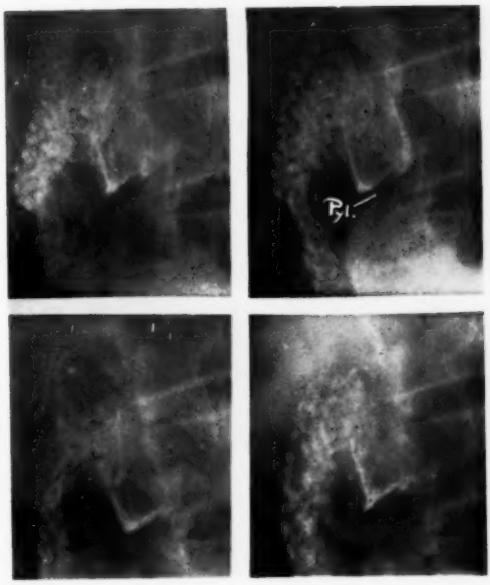

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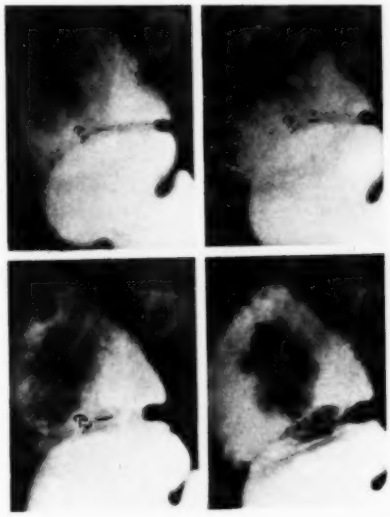

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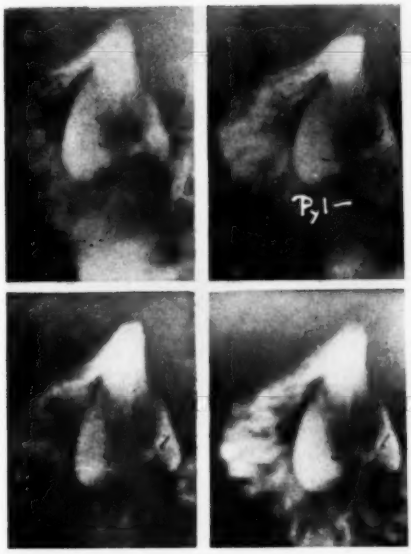

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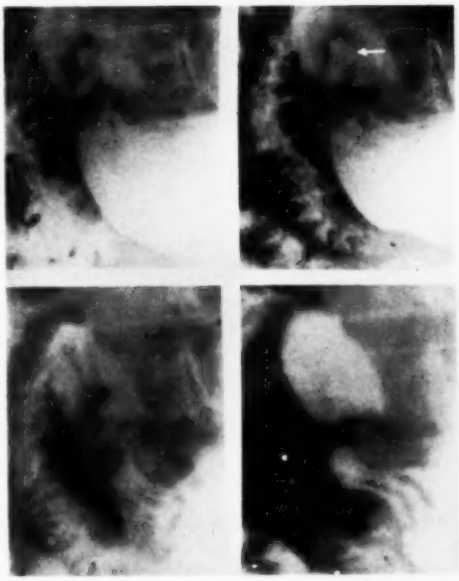

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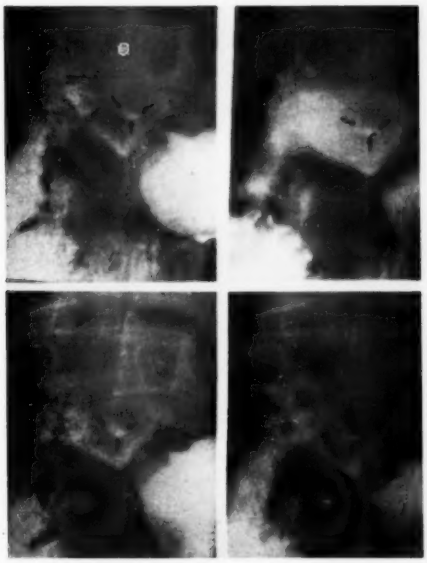

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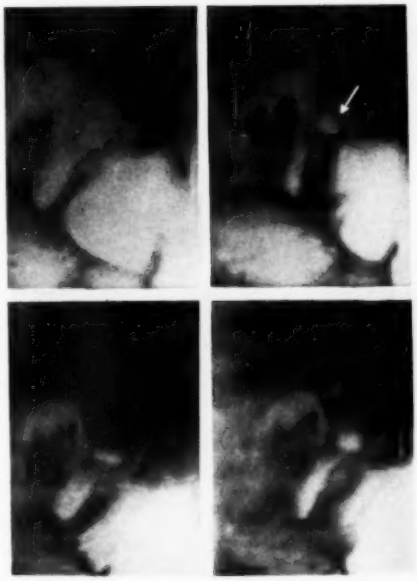

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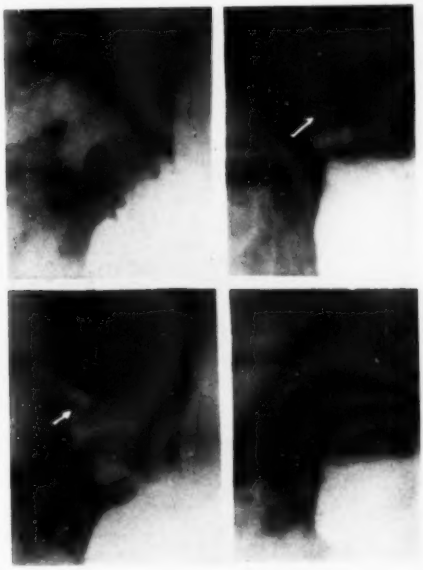

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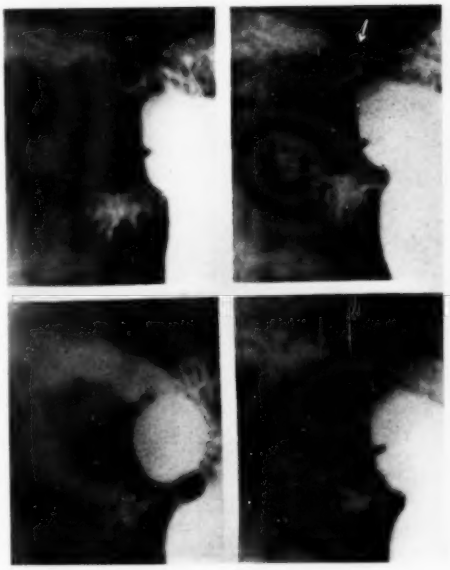

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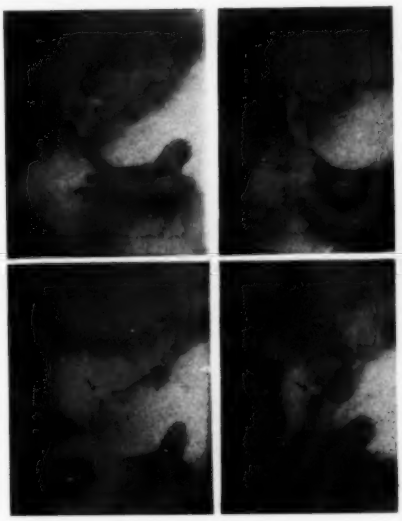

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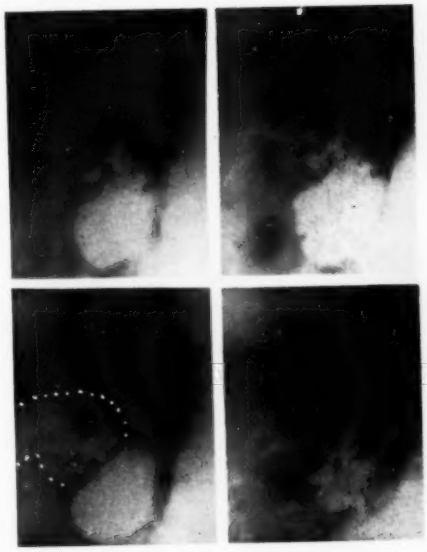

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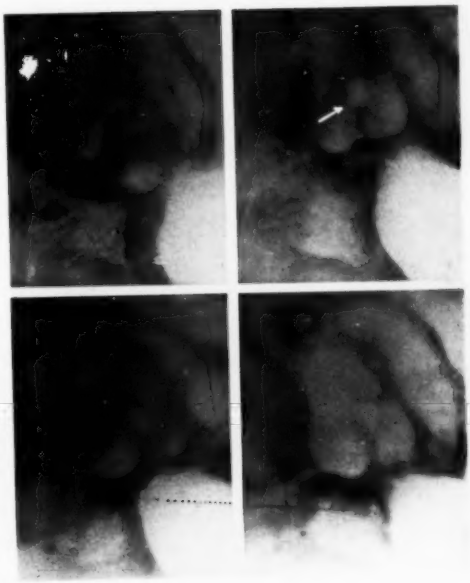

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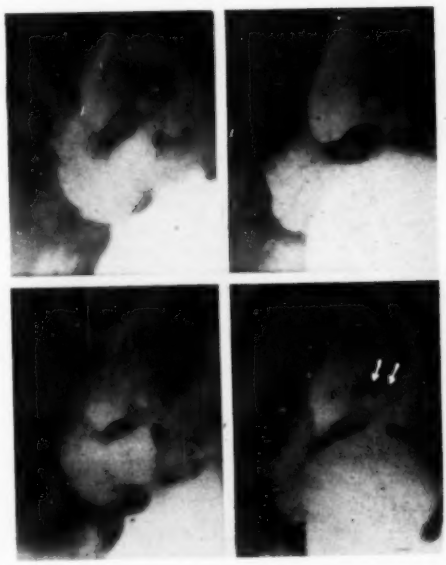

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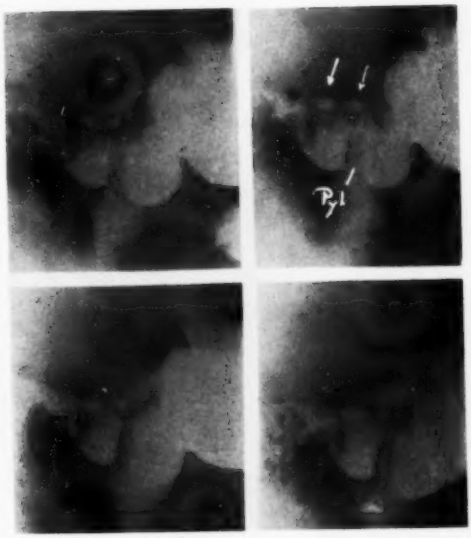

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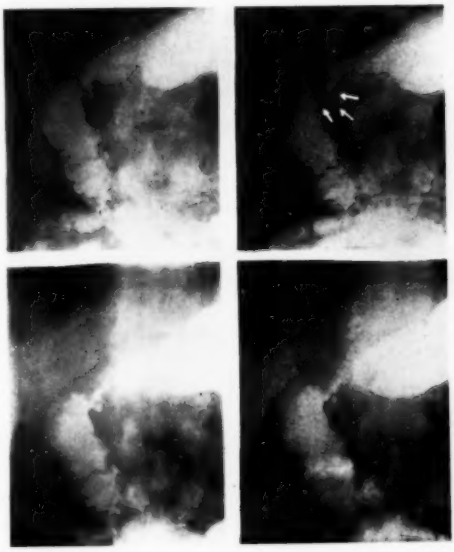

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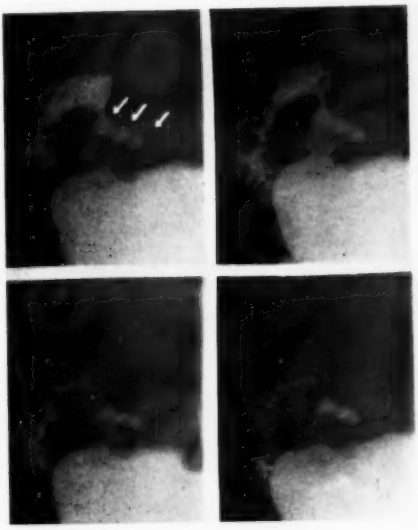

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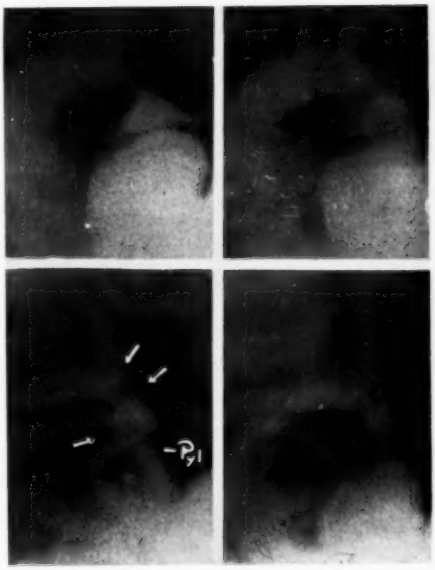

Fig. 19.

Fig. 20.

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EXPLANATIONS OF FIGURES:

Tabula XL. Fig. 1. Different types of normal relief appearance of the mucous membrane in the bulb, apparent on compression (in fig. 1 there are *two* and in fig. 2 *one* non-compressed picture for comparison).
» 2.
» 3.
» 4.

» *XLI.* » 5. Non-compressed, apparently quite normal bulb.
» 6. The same bulb, compressed, with evident niche.

» 7.
» 8.
» *XLII.* » 9.
» 10. Different cases of bulbar niche, evident on compression, within an otherwise normal or slightly deformed bulbar shadow. In *one* of the serial pictures for *each* case the degree of compression has been somewhat reduced in order to show the importance of the compression for demonstrating the niches.
» 11.
» 12.
» *XLIII.* » 13.
» 14.

» 15. Case of *double* ulcers, »contact ulcers», »kissing ulcers», evident on compression of a non-deformed bulb.
» 16.

» *XLIV.* » 17. Cases with *two* or *three niches* evident on compression of deformed bulbi.
» 18.
» 19.

» 20. Case of an *enormous niche*, the size and shape of which was well in accord with a normal bulb shadow, whereby the niche without compression might easily have been wrongly interpreted as a normal bulb.

FROM THE ROENTGEN-DEPARTMENT OF THE RIGSHOSPITAL, COPENHAGEN.
CHIEF: DR. H. J. PANNER

A CASE OF VERTEBRA PLANA (CALVÉ) [1]

by

H. J. Panner

(Tabula XLV)

A little more than two years ago, CALVÉ was the first to call attention to an affection of the vertebral column — of which he describes two cases — which he compares with CALVÉ-PERTHES' hip disease and KOEHLER's disease of the navicular bone; and recently the Dutch scientist, HARRENSTEIN, has communicated two other, similar cases; but otherwise that affection does not appear to have been mentioned anywhere, and must, thus, be accounted as among the rare occurrences.

It may, therefore, be of interest to bring forward and discuss at some detail a case of that same affection, which I believe to have observed; especially as the history of this case is peculiar in several points; among others in the fact that the patient has been observed for eight years after the affection first declared itself.

The case is that of a man who is now 22 years old and a farmer. On September 5th, 1919 — when he was 14 years old — he was admitted into the Dep't D. of the Rigshospital (Prof. SCHALDEMOSE) under the diagnosis: spondylitis tuberculosa. From the journal of the Dep't at that time it is seen that: "one of his brothers is stated to be suffering from 'glands'; otherwise the family is in good health."

The patient, too, had formerly been in good health and, especially, had not shown any symptoms either of scrofula or of lung troubles. A year before being admitted into the hospital he began, little by little, to suffer from a steadily increasing weakness of the back which, after a couple of months, incapacitated him for any work or occupation. He had difficulty in keeping himself upright when walking, and had to use a stick. Later, he got pains in the chest and in the part of the back corresponding to the lower dorsal vertebræ; and some months before he was admitted to the hospital a slight gibbus began to develop at a level with the point of the back where the pains were felt. The attacks were varying in strength. On the whole they were not very intense; still at times enough to make him keep his bed; and, at any rate, he was unable to work. There was no weakness of the lower

[1] A communication made at the Fifth Meeting of the Northern Association for Medical Radiology, Copenhagen, July 1st, 1927.

extremities, and absolutely no other signs pointing to a compression of the medulla. Altogether, there were no pathological symptoms whatever, except the ones just described.

At the time of his admission the patient looked healthy, robust and in a fairly well-nourished condition. Investigation of the organs showed nothing abnormal.

The investigation of the vertebral column showed a *slight* arcuate kyphosis, with prominence corresponding to the 8th and 9th thoracic vertebræ, no scoliosis, and no tenderness either direct or indirect. There was a slightly increased lordosis of the lumbar region. He could rise from a recumbent position without using his hands, and had no difficulty in bending to pick up things from the floor. After being kept in bed for a short period he felt perfectly well: after a couple of weeks he was allowed to be out of bed again, found no return of the pains from being up and moving about, and was discharged in good health, on October 10th, 1919. There had been no rises in his temperature during his stay in the hospital.

Roentgen examination of the spinal column, on Sept. 6th, 1919, showed — as seen by Fig. 1 — nothing abnormal except as regards the 9th thoracic vertebra, the body of which, in the lateral view, is only represented by a very narrow shadow, a couple of millimeters high, with a slight, wavy irregularity of demarcation upwards and downwards. This shadow is, if anything, rather more intense than the shadows of the vertebræ immediately above and below. The bodies of the 8th and 10th thoracic vertebræ show a perfectly natural, respectively upper and lower, outline; and each of them forms the limit of a somewhat wedge-shaped intervertebral space, narrower anteriorly than posteriorly owing to the existence of a gibbosity, which is due to the fact that the anterior margins of the 8th and 10th vertebræ have approached to one another. The interval between the posterior margins of those two vertebræ is about twice as wide as the one between their anterior margins; but there nevertheless remains a distinct space, also anteriorly, between the pathologically altered vertebræ and either of its neighbours. Posteriorly, the intervertebral spaces between the 9th vertebra and its neighbours are of more or less normal height. The 9th vertebra, with its small vertical diameter, is seen very distinctly also in the antero-posterior view (Fig. 2); but otherwise the pathological features stand out best in the side-view. There is no scoliosis, and no shadows of any gravitation abscess.

We were rather at sea as to the exact nature of the affection I have described here. We did not think it could be the case of any tuberculous process — a supposition spoken against, moreover, by the whole clinical picture with its very light symptoms. We thought that possibly it might be a case of some congenital anormality.

The picture of that roentgen observation stayed in my mind, however; and when I read that article of CALVÉ's to which I referred in the beginning, I was struck by the similarity between the roentgen pictures of his cases and those of my own; so I decided to look up our patient and inquire as to the course his affection had taken in the intervening years.

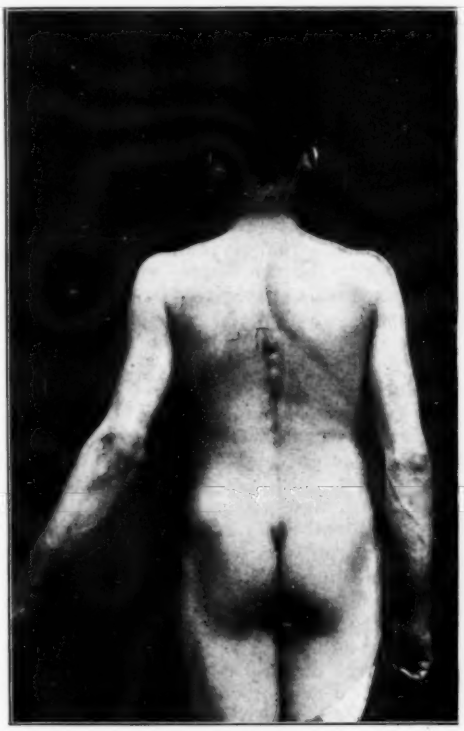

Fig. 3.

Fig. 4.

I found that during the first four years he had been so well that he had worked as a farm hand in the country without feeling any inconvenience except for a slight pain in the back now and then; but that, beginning with the fall of 1923, the pains had gradually become more intense, until they finally became so strong that, on May 1st, 1924, he had to be admitted into the State Hospital at Sønderborg (Chief Surgeon: Dr. J. IPSEN), where his case was taken to be one of a spondylitis not entirely subsided. At first, he was put in a plaster-jacket; but his condition soon improved, and the plaster-jacket was, therefore, exchanged for a leather corset, which he has worn ever since. His condition has remained more or less unchanged. He has frequently, for certain short periods, had more or less pains in his back; but has nevertheless in the meantime been able to perform most of his work, though he cannot get along without his corset. Apart from the trouble with his back, he feels perfectly well; and an objective examination discloses no anormality beyond that trouble. His looks are healthy, and his musculature is strongly developed (see Figs. 3—4).

As it will be seen from the pictures, there is a slight kyphosis, corresponding

to the 8th, 9th and 10th thoracic vertebræ. There is no tenderness, either direct or indirect, corresponding to that region; but while the rest of the column is freely movable, that part of it is held rigid when the patient moves his back. He can bend over and pick up things from the floor without support; but if he has to remain in the bent position for any length of time he is obliged to use his hands and take hold somewhere, as, otherwise, he gets pains in the region of the gibbus. There are no signs of any gravitation abscess.

PIRQUET's test gave, on the second to third day, a barely visible redness around the scratches; that is to say, a rather negative reaction.

Roentgen examination disclosed a condition strongly reminding of what had been observed on the previous occasion. In the lateral view (Fig. 5) the body of the 9th vertebra is still seen as a very flat disc — a little irregular in form and uneven in shadow — without any distinct appearance of osseous structure. The gibbus is now more strongly pronounced than formerly, the bodies of the 8th and 10th vertebræ touching one another with their anterior margins; and here a small triangular shadow is seen, slightly in front of the anterior surface of the column, in prolongation of — but separated from — the 9th vertebra. The intervertebral spaces between the three vertebræ are a little smaller than before, smallest in the anterior direction; but there is absolutely no sign of any destructive process. While the body of the 9th vertebra, thus, appears as very small, its arch and posterior portion do not seem to present any abnormal features. Altogether, it is not easy to make out the details plainly, owing to the existence of a strongly arcuate dextro-convex scoliosis, which is distinctly seen in the ventro-dorsal projection (Fig. 6). In the lateral view, the scoliosis is responsible for the remarkable feature of the narrow 9th vertebra appearing projected over the 8th one. In a similar manner, the features of the ventro-dorsal picture are veiled by the gibbus formation so as to make it impossible to make out the details, and so that, for instance, the pathological 9th vertebral body cannot be differentiated from its neighbours at all. The small triangular shadow in front of that body is undoubtedly that of a reactive, reparatory osteophytic formation there.

CALVÉ says that the case which came under his own observation (the second which he mentions having been communicated to him by the American Dr. BRACKETT) had for a long while been taken by him for one of spondylitis, and had been treated as such, until the child was roentgen-photographed, when he immediately realised that it was *not* spondylitis. It was the same with our patient. In the flat, rudimentary vertebra, with the well-preserved intervertebral spaces toward its nearest neighbour on either side — which were likewise perfectly intact — there was nothing that resembled tuberculosis. That disease very soon causes the intervertebral spaces to become affected, and it would seem absolutely inconceivable that a tuberculous process responsible for a pathological change as extensive as the one here observed should have left the vertebral pads intact. When to this it is added that the change does not resemble a tuberculous process at all, that there are no signs of any gravitation abscess, and that PIRQUET's test proved negative — then there is

no reason for conjecturing tuberculosis to be the etiological factor in the present case. Nor does caries from any other known cause seem to be a reasonable explanation. CALVÉ discusses the possibility of a KÜMMEL's kyphosis, but only to reject it immediately; in the first place because there had been no traumatic element in his case, and in the second place because the existant anatomical abnormality did not in any way look like the result of a fracture. The same must be said of our case. The fracture of a vertebra can very well result in a reduction of its vertical diameter, but not in the manner observed here. It will usually become asymmetrical and wedge-shaped, and its body broader than those of its neighbours; but it never could get the regular, disciform shape that it has in the present case.

It, therefore, seems likely that — as CALVÉ suggests — we have to do here with a peculiar affection of its own, akin to CALVÉ-PERTHES' hip disease, KOEHLER's disease of the navicular bone, and some others.

While CALVÉ believes that the flat vertebral shadow observed in his case represents all of the body of the vertebra, and that the disease, consequently, shows itself by "too little bone and too much cartilage", HARRENSTEIN holds a slightly different opinion, in so far as he thinks that some of the seemingly broad space between the vertebræ may possibly be accounted for as non-shadow-giving portions of the vertebral body. He bases that opinion on the fact that in one of his two cases — which he examined at a rather early stage; that is, a couple of months after the first symptoms appeared — he saw *the whole* of the diseased vertebra, as a wedge-shaped body giving only a feeble shadow, somewhat smaller than the nearest vertebra on either side, and the intervertebral spaces a little smaller than the nearest corresponding ones. It was not until later that the low, characteristic shadow appeared, and then separated from its neighbours by a wide intervertebral space on either side. HARRENSTEIN also sees a support for his opinion in the case observed by BRACKETT, because radiographs taken of the latter at an interval of 18 months show the narrow vertebral shadow to have become broader, vertically, during that time. He sees in that a circumstance pointing to the existence of some vertebral tissue not visible, in which the regenerative process may have started. As to which theory is the right one — CALVÉ's or HARRENSTEIN's — I shall have no opinion.

A certain amount of difference does exist, at any rate, between the process here described and the other, presumably kindred affections mentioned in the foregoing. To compare it with KOEHLER's disease of the navicular bone, for instance, it has always been main-

tained as characteristic of the latter that the interspace between the talus and the cunieforms is the same on the diseased and the healthy side, and that it remains so until the complete recovery which probably always takes place. With the disease of the vertebra it is not so. There it is, at all events, a question of an actual diminution — in vertical diameter — of the diseased vertebral body, and in none of the cases published has there been a complete restitution »ad integrum». In all the cases, the latest radiograph taken shows — even when the clinical healing is to all appearances complete — a vertebra reduced in height, of somewhat irregular outline both upwards and downwards, and of a structure departing from the normal, generally somewhat consolidated.

It is possible that these characteristic differences may be due to the difference in the statical conditions that obtain for the navicular bone and the vertebræ, respectively; the pressure on the latter being considerably greater and, therefore, not offering as good conditions for a complete restitution as in the case of the former. In other words, precisely the same argument that has been advanced with regard to CALVÉ-PERTHES' hip disease, as an explanation of why that affection is less benign in its consequences than the navicular one.

At any rate, our case— which must undoubtedly be classed in the same category as the four previously published, and which now offers the additional interest of having come under renewed observation nine years after the first symptoms appeared — proves that the disorder is by no means a slight one, but can result in considerable deformity and in grave inconveniences to the patient. It furthermore shows that it is very difficult to say when a definite healing has taken place; seeing that, as a matter of fact, in this case the symptoms of the disease have existed — although exhibiting themselves with varying degree of strength — for nine years. When the other cases published have received the notation: »cured» it is possibly only because the subjects have not, like the patient in our case, been obliged to perform any work, and that, consequently, no great demands have been made on their powers of exertion, seeing that, at the beginning of their disease, they were much younger; namely — respectively — $2^1/_2$ (CALVÉ), 7 (BRACKETT), 5 and 5 years old (HARRENSTEIN). With our own case in mind, I believe that a much longer period of observation is necessary before it is in any way safe to speak about a definite cure; and it may probably be taken for granted that the treatment should consist, for a very long time, in close observation and sparing the patient for any bodily exertion.

It seems to me reasonable to suppose the existence of a special

Fig. 1.

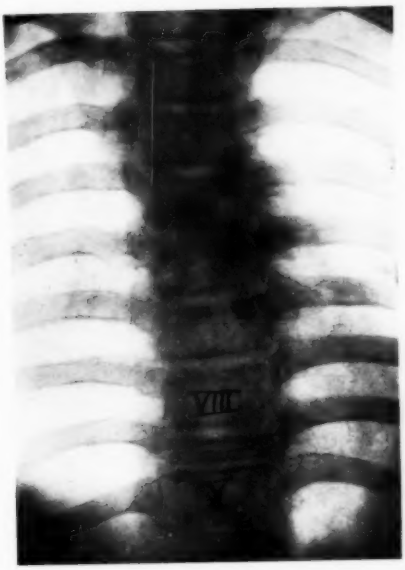

Fig. 2.

Fig. 5.

Fig. 6.

disorder, of its own distinctive character, and which might suitably be denominated: *Vertebra plana* (CALVÉ); — a disorder, in its clinical features strongly resembling a tuberculous spondylitis, but far milder in its course, and probably to be classed among the already numerous affections specific of juvenile growth, as a rule benign in character, still not infrequently followed by serious consequences, as it is perhaps most frequently the case with the hip disease. The lower thoracic vertebræ are the seat of the affection in all the cases published, and would, thus, appear to be the ones most liable to its attack. HARRENSTEIN suggests that probably not a few cases may have passed unrecognised, being taken for cases of spondylitis; but in that I do not believe he is entirely right. The roentgenological picture is so characteristic that any experienced roentgenologist would immediately have his attention arrested by it, and would realise the peculiarity of its features, even though one does not at once establish a new pathological entity on the basis of a single case.

SUMMARY

The author reports a case, presumably of the kind which CALVÉ has described under the designation: Vertebra Plana. The affection can evidently be one of considerable chronicity, seeing that in the present case the first symptoms declared themselves nine years ago and the patient cannot be said to be well yet. The roentgen examination showed serious changes; namelv, a pronounced kyphoscoliosis corresponding to the lower thoracic vertebræ, and a very much diminished vertical diameter of the body of the IXth of that series. There were no signs of spondylitis or of any other known destructive disorder. Though benign as compared with spondylitis, the affection can, thus, produce considerable changes, both pathological and anatomical, akin to what is observed in severe cases of Calvé-Perthes' hip disease. It probably belongs to the same category of juvenile growth diseases as the latter. It will probably be a matter of difficulty to determine, in the individual case, when the disease has finished its course, and whether the existing symptoms are due to the affection itself or to its resulting consequences.

ZUSAMMENFASSUNG

Verf. berichtet über einen Fall, vermutlich von der Art, wie sie CALVÉ unter der Bezeichnung Vertebra plana beschrieben hat. Die Affektion kann offenbar sehr chronisch verlaufen, da die ersten Symptome sich im vorliegenden Falle vor 9 Jahren gezeigt hatten, und der Patient bis heute noch nicht als gesund bezeichnet werden kann. Die Röntgenuntersuchung zeigte ernste Veränderungen; nämlich eine ausgesprochene Kyphoskoliosis entsprechend den unteren Thorakalwirbeln und einen sehr stark verkleinerten vertikalen Durchmesser des Wirbelkörpers vom Th IX. Es fanden sich keine Zeichen von Spondylitis

oder irgend einer anderen bekannten destruktiven Erkrankung. Obgleich benign im Vergleich mit der Spondylitis, kann die Affektion beträchtliche pathologisch anatomische Veränderungen hervorrufen, von verwandter Art wie die bei schweren Fällen der CALVÉ-PERTHES'schen Hüfterkrankung beobachteten. Sie gehört wahrscheinlich zur selben Kategorie jugendlicher Wachstumserkrankungen wie die letztere. Im Einzelfalle dürfte es schwer sein, zu entscheiden, wann die Krankheit abgelaufen ist, und ob die bestehenden Symptome durch diese selbst oder ihre Folgen bedingt sind.

RÉSUMÉ

L'auteur communique un cas qui appartient probablement à ceux que CALVÉ a décrits sous le nom de «vertebra plana». Cette affection présente manifestement un caractère marqué de chronicité: dans le présent cas, en effet, les premiers symptômes ont fait leur apparition il y a neuf ans et le malade ne peut, à l'heure actuelle, être considéré comme guéri. L'examen radiographique permet de constater des lésions graves et notamment une cyphoscoliose prononcée au niveau de la dernière vertèbre dorsale et une diminution marquée du diamètre vertical du corps de la 9e vertèbre dorsale. On n'a pas trouvé de spondylite ni d'autres lésions destructives connues. Bien que bénigne, comparée à la spondylite, l'affection est susceptible de produire des modifications importantes, à la fois pathologiques et anatomiques, analogues à celles qu'on a notées dans plusieurs cas d'affection coxale de Calvé-Perthes. C'est donc probablement une affection appartenant au même groupe d'affections juvéniles de la croissance que cette dernière. Il est à présumer qu'on pourra éprouver, dans les cas individuels, quelque difficulté à déterminer le moment où l'affection est arrivée au terme de son évolution et à élucider la question de savoir si les symptômes que l'on observe sont dus à l'affection elle-même ou à ses conséquences.

LITERATURE

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ÜBER RESPIRATORISCHE VERÄNDERUNGEN IN LUNGENFELD, MEDIASTINUM UND ZWERCHFELL UNTER NORMALEN VERHÄLTNISSEN UND BEI GEWISSEN KRANKHAFTEN ZUSTÄNDEN DER LUNGE UND DES BRUSTFELLS (VORLÄUFIGE MITTEILUNG)

von

Hugo Laurell

Unter normalen Verhältnissen bilden hauptsächlich die Arterien die Hilusschatten sowie die Lungenzeichnung im übrigen (die positive). Die Lungenvenen zeichnen sich schmaler und undeutlicher ab als die entsprechenden Arterien u. a. deshalb, weil ihre Wandungen wesentlich dünner sind, und weil ihr Lumen — wenigstens in vivo — schmaler ist.

Die verhältnismässig geringe Blutfüllung der Lungenvenen in vivo ist teilweise darauf zurückzuführen, dass die linke Hälfte des Herzens fast beständig eine saugende Wirkung auf das Blut in den Lungenvenen ausübt. Während der Kammersystole geschieht infolge der starken systolischen Wanderung des Septum atrioventriculare gegen die Herzspitze eine kräftige Einsaugung von Blut in beide Vorhöfe von den dort mündenden Venen. Während der Diastole dagegen kommt eine ihrer Intensität nach mit der Respirationsphase wechselnde Saugung zustande, die namentlich durch die dilatierende Wirkung hervorgerufen wird, die die Elastizität der Lungen auf das Herz ausübt.

Die Lungenarterien haben auch post mortem eine erheblich grössere totale Kapazität als die Lungenvenen. Hierdurch unterscheidet sich also der kleine Kreislauf von dem grossen, bei dem dagegen die Kapazität der Venen wesentlich überwiegt.

Die Blutfüllung der Lungengefässe ist häufig in vivo bei liegender Stellung grösser als bei stehender. Namentlich ist dies bei den Gefässen in den kefalen Teilen der Lunge der Fall. Der Unterschied in der Gefässweite ist bei asthenischen Individuen mit arterieller, ortostatischer Anämie oft besonders auffallend.

Es liegt die Vermutung nahe, dass die schlechte Durchblutung der Lungenspitzen bei asthenischen Individuen, die beim Stehen ein stark herabgesetztes Minutenvolumen haben können — siehe BJURE und LAURELL, Upsala Läkareförenings förhandlingar Bd. 33 — die Entstehung einer Lungenspitzentuberkulose begünstigen kann.

Mehrere Umstände sprechen dafür, dass die Respiration die verschiedenen Gefässgebiete der Lunge, was Weite und Kapazität der Gefässe anbelangt, in verschiedener Weise beeinflusst. Wenn der Blutgehalt der Lungen beim Einatmen zunimmt, so erhalten scheinbar nur die Arterien und Venen der Lungen — oder hauptsächlich diese — eine erhöhte Kapazität, nicht aber oder nicht in demselben Masse die Kapillaren. Dies hängt wahrscheinlich damit zusammen, dass die erstgenannten Gefässe infolge der elastischen Kräfte der Lunge inspiratorisch einer erhöhten Dehnung in allen Richtungen ausgesetzt sind, die Kapillaren aber dehnen sich fast nur in der Längsrichtung. Bei der inspiratorischen Streckung nehmen die Kapillaren an Weite (während eines Teils der Einatmung vielleicht auch an Kapazität) ab, während sie bei der Ausatmung an Weite zunehmen. Da also die Kapazität der Arterien bei der Einatmung zunimmt und die Kapillaren gleichzeitig verengt werden, so arbeiten sich diese beiden Faktoren der Blutströmung durch das Kapillargebiet entgegen; in welchem Grade dies geschieht, ist jedoch schwer zu entscheiden. Da die Arterien umgekehrt während der Ausatmung an Weite und Kapizität ab-, die Kapillaren aber gleichzeitig an Weite zunehmen, so scheint es wahrscheinlich, dass die Durchblutung der Kapillaren während dieser Atmungsphase zunimmt.

Wenn diese Theorien über die Wirkung der Respiration auf die Blutverteilung in den Lungen richtig sind, so ergibt sich daraus, dass die Verschleierung resp. Erhellung, die das Lungenfeld bei Exspiration resp. Inspiration auf der Röntgenaufnahme zeigt, nicht nur auf einen wechselnden Luftgehalt zurückzuführen ist, sondern auch auf eine wechselnde Weite und einen wechselnden Blutgehalt der Kapillaren.

Berücksichtigt man einerseits den relativ grossen Blutreichtum der Alveolen während des Exspiriums, und anderseits dass diese Atmungsphase unter normalen Verhältnissen länger ist als die Einatmung, und zieht man ferner in Betracht, dass die Alveolarluft beim Übergang zwischen Ein- und Ausatmung am reinsten ist, und dass während eines Teils der Einatmungsphase auch unreine Luft aspiriert wird, so scheint es wahrscheinlich, dass während der Ausatmung ein wenigstens ebenso grosser Gasaustausch zwischen Blut und Alveolarluft zustande kommt wie während der Einatmung.

Bei gewissen Formen von einseitiger Bronchostenose tritt während

der Einatmung an der stenosierten Seite eine paradoxe Verschleierung und während der Ausatmung eine parodoxe Erhellung des Lungenfeldes auf, Phänomene, die auf abnorme Blutverschiebungen zu den Lungenkapillaren resp. von ihnen hinweg zurückzuführen sind; diese Verschiebungen haben ihren Grund einerseits in abnorm starken intraalvolären Druckveränderungen, anderseits — was die paradoxe inspiratorische Verschleierung anbelangt — darin, dass die Kapillaren in der stenosierten Lunge infolge einer relativ geringen inspiratorischen Erweiterung dieser Lunge sich nicht auf normale Weise an Länge dehnen und an Weite abnehmen.

Durch Einspritzung einer kleinen Menge Lipiodol in den Perikardialsack bei einem Kaninchen in Rückenlage, wobei sich die Kontrastflüssigkeit so um die hintere Fläche der Kammern lagerte, dass die Grenze zwischen Vorhof und Kammer hervortrat, liess sich beobachten, dass die Kammerbasis während der Herztätigkeit grosse Exkursionen in der Längsrichtung des Herzens ausführte. Die Pulsationen, die die Herzspitze und die äussere Kontur des Herzens im übrigen zeigten, waren demgemäss nur klein. Das nämliche konnte bei Akupunktur mit darauffolgender Durchleuchtung beobachtet werden. Diese Beobachtungen an Tieren sowie mittels Röntgen gemachte approximative Bestimmungen der systolischen und diastolischen Grösse des Herzens beim Menschen haben die schon früher von vielen Anatomen und Physiologen gehegte Ansicht bestärkt, dass das Septum atrioventriculare während der Herztätigkeit wie ein Kolben in einem Pumpapparat hin- und herwandert. Ansichten, die auch in hohem Grade gestützt werden durch die röntgenologischen Beobachtungen, die Zezschwitz 1924 über die Exkursionen veröffentlicht hat, die ein am Sulcus atrioventricularis nach hinten zu eingekeilter Granatsplitter während der Herztätigkeit ausführte, obgleich Z. selbst die Konsequenzen seiner Beobachtungen nicht recht eingesehen zu haben scheint. »Die Bewegung des Splitters ähnelte dem Vor- und Rücksprung eines Insekts. Bei frontalem Strahlengang sah man einen aufblitzenden etwa 3 cm (!) langen nach abwärts gerichteten Vorstoss mit schnell folgendem Rücksprung und plötzlichem kurzem Stehenbleiben, worauf ein ruhiger diastolischer Bogen nach oben führte. Dann vertikales Aufschnellen der Bewegung während der Präsystole und Neubeginn der Revolution.»

Zusammen mit Bjure hat Verf. nachweisen können, dass eine direkte Proportionalität zwischen der Grösse der äusseren Pulsationen der linken Kammer und dem Schlagvolumen des Herzens nicht vorhanden ist, sondern dass hingegen in gewissen Fällen eine erhöhte Pulsationsamplitude ein vermindertes Schlagvolumen angibt. Derartige erhöhte Kammerpulsationen bei gleichzeitig erhöhter Herzfre-

quenz entstehen häufig bei asthenischen Patienten in stehender Stellung, und doch haben diese Patienten dabei sowohl ein vermindertes Schlag- als Minutenvolumen; sie leiden an einer ortostatischen, arteriellen Anämie. Diese Beobachtungen bilden offenbar einen weiteren Beweis dafür, dass das Schlagvolumen vor allem durch die Grösse der Septumverschiebung bestimmt wird.

Bei erhöhtem Widerstand gegen die Kaudalwanderung des Septum atrioventriculare und somit verminderter systolischer Septumverschiebung, z. B. bei herabgesetzter Blutzufuhr in die in die Vorhöfe mündenden Venen oder bei Synechia pericardii in der Gegend der Herzbasis, muss die Herzspitze und die äussere Fläche der Kammer erhöhte Pulsationen zeigen. Diese können sich da als Herzklopfen oder systolisches Einziehen der Thoraxwand in der Gegend der Herzspitze bemerkbar machen.

Verf. ist, wie früher SEHRWALD, zu der Auffassung gekommen, dass die saugende Wirkung, die die systolische Septumverschiebung im Blut der Lungen- und Hohlvenen normaliter hervorruft, bei Entstehung der accidentellen, systolischen Nebengeräusche eine grosse Rolle spielt, da, wie man sich vorstellen kann, diese saugende Wirkung bei gewissen Zuständen, z. B. bei herabgesetzter Blutmenge oder herabgesetzter Viskosität des Blutes abnorm starke Wirbel im Blut namentlich in den Vorhöfen hervorrufen kann.

Das Herz zeigt im allgemeinen unter normalen Verhältnissen während der Einatmung eine respiratorische Pendelbewegung nach rechts und während der Ausatmung nach links. Diese Pendelbewegung des Herzschattens ist wohl vor allem auf eine verschieden starke Füllung der beiden Herzhälften während der verschiedenen Atmungsphasen zurückzuführen. Während der Einatmung füllt sich namentlich die rechte, während der Ausatmung die linke Herzhälfte. Bei starker Verschiebung des Zwerchfells kann man häufig sehen, wie die rechte Herzkontur zuerst nach rechts und dann wieder nach der Mittellinie zu wandert, das letztere scheint zum Teil eine Folge der inspiratorischen Streckung und Ausspannung des Perikardialsackes in die Länge zu sein. Mitunter nimmt das Herz während der ganzen Einatmung nach beiden Seiten an Breite zu, um während der Ausatmung wieder an Breite abzunehmen.

Eine ausgesprochene inspiratorische Anschwellung und exspiratorische Abnahme des Herzschattens ist in der Regel ein pathologisches Phänomen, das bei erschwerter Luftpassage zu und von den beiden Lungen entsteht. Man beobachtet dabei ähnliche Volumenveränderungen des Herzens und des sonstigen Mediastinums wie bei einem kombinierten MÜLLER'schen und VALSALVA'schen Versuch. Schon ein einfacher Schnupfen mit Verstopfung der Nase kann bei

Atmung durch die Nase diese Phänomene hervorrufen. Noch ausgesprochener sieht man sie bei schweren Formen von Trachealstenose, Asthma bronchiale und diffuser Bronchitis. Möglicherweise können ähnliche Phänomene auch bei gewissen kongenitalen Herzfehlern mit abnormer Verbindung zwischen den beiden Herzhälften entstehen.

Eine mehr oder weniger starke respiratorische hin- und hergehende Wanderung des Mediastinums — inspiratorisch nach der kranken Seite zu — kann man, vorausgesetzt, dass auch der Brustkorb an der kranken Seite ausgesprochene respiratorische Volumenveränderungen zeigt, bei vielen einseitigen Lungen- und Pleuraaffektionen beobachten. Eine derartige mässige Wanderung kann schon dadurch geschehen, dass das Lungengewebe an der einen Seite infolge krankhafter Prozesse weniger dehnbar ist als an der anderen. Eine noch ausgesprochenere Mediastinalwanderung entsteht bei starker einseitiger Bronchostenose, und ferner wenn eine grössere Menge freies Gas, freies Exsudat oder Därme (bei Hernia des Zwerchfells) in der einen Pleurahöhle vorhanden sind.

Die Mediastinalwanderung bei einseitiger Bronchostenose, Pleuritis, geschlossenem Pneumothorax und grosser pleuritis-ähnlicher Hernia diaphragmatica hat einen pendelnden Charakter, wobei sich die kaudalen Teile des Mediastinums am weitesten verschieben. Diese Pendelbewegung ist nicht nur auf eine während des Atmens auftretende Druckdifferenz an beiden Seiten des Mediastinums zurückzuführen, sie beruht vielmehr auch darauf, dass die Verkürzung resp. Verlängerung des Zwerchfells eine verschiedene dislozierende und umformende Wirkung auf die beiden Zwerchfellkuppeln ausübt. An der kranken Seite verursacht nämlich eine inspiratorische Verkürzung des Zwerchfells ein Herüberziehen des Centrum tendineum nach der lateralen Thoraxwand zu, während seine exspiratorische Verlängerung eine entgegengesetzte Bewegung des Zentrums zur Folge hat. Handelt es sich um die der oben erwähnten krankhaften Zustände, die von einer Senkung und Abplattung der Zwerchfellkuppel an der kranken Seite begleitet sind, während die Kuppel an der gesunden Seite im grossen und ganzen ihre normale Form beibehält oder gewölbter als normaliter ist, so kann man sich leicht vorstellen, dass die inspiratorische Verkürzung des Zwerchfells betreffs Dislokation und Umformung der beiden Kuppeln eine verschiedene mechanische Wirkung verursacht (siehe Fig. 1). Die Zwerchfellverkürzung macht sich häufig an der kranken Seite vor allem durch ein Herüberziehen des Centrum tendineum und des kaudalen Ansatzes des Mediastinums nach der lateralen Thoraxwand zu bemerkbar, an der gesunden Seite dagegen durch eine Senkung der Kuppel.

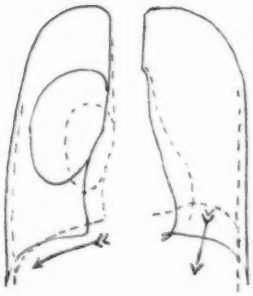

Fig. 1.

Rechtseitiger Pneumathorax

——— Inspirium
– – – Expirium.

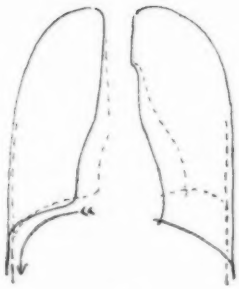

Fig. 2.

Rechtseitige Bronchostenose

——— Inspirium
– – – Expirium

Eine ausgesprochene Pendelbewegung des Mediastinums tritt jedoch auch dann häufig auf, wenn die Kuppel an der kranken Seite nur wenig gesenkt ist (wie bei kleinem und freiem, geschlossenem Pneumothorax), ja in gewissen Fällen auch dann, wenn diese Kuppel abnorm hoch steht (wie bei gewissen Formen von Bronchostenose). In diesen Fällen kann die Kuppel sich an der kranken Seite trotz ihrer gewölbten Form infolge des durch die Senkung hervorgerufenen Widerstandes (Unterdruck im Thorax) inspiratorisch auf normale Weise nicht senken: die Kuppel wird hingegen bei ihrer Verkürzung das Zentrum in laterale Richtung ziehen (siehe Fig. 2). Auch in den Fällen von Bronchostenose, wo das Zwerchfell an der kranken Seite hoch steht und eine paradoxe inspiratorische Kefalwanderung ausführt, wird das Mediastinum gleichzeitig nach der Seite hin herübergezogen.

Bei Pneumothorax und Bronchostenose schwillt das Herz inspiratorisch nach der kranken Seite zu abnorm stark an, was zur Pendelbewegung des Mediastinalschattens beiträgt.

Die Pendelbewegung des Mediastinums bei geschlossenem Pneumothorax trägt in hohem Grade zur Ventilation der basalen Teile der gesunden Lunge bei.

Die bei grosser Seropneumothoraxhöhle häufig beobachtete paradoxe Verschiebung ist teilweise auf die respiratorischen Volumenveränderungen zurückzuführen, die die kaudalen Teile dieser Höhle unter Einfluss der Pendelbewegungen des Mediastinums erfahren. Infolge der inspiratorischen Verengerung der Höhle in seitlicher Richtung steigt die Flüssigkeit in die Höhe und umgekehrt. Wenn eine zuerst vorhandene starke paradoxe Verschiebung des Flüssigkeits-

niveaus erheblich abnimmt, so ist dies oft das Zeichen einer eintretenden Sekundärinfektion der Flüssigkeit mit Lähmung des Zwerchfells an der kranken Seite, wodurch auch die Ventilation der gesunden Lunge in hohem Grade erschwert wird.

Von differentialdiagnostischem Interesse ist die starke Mediastinalwanderung, die bei grossem, serösem oder serofibrinösem Pleuraexsudat bei tiefer Atmung auftritt. Eine starke Wanderung sieht man nämlich bei septischem Empyem, wo das Zwerchfell beteiligt ist, niemals, u. a. deshalb, weil das Zwerchfell dann an der kranken Seite gelähmt ist.

ZUSAMMENFASSUNG

Verf. erörtert die Einwirkung der Respiration auf die Blutverteilung in den verschiedenen Gefässgebieten der Lunge und im Herzen; ferner die Einwirkung der Körperstellung auf den Blutgehalt der Lungen und des Herzens sowie auf die Grösse der zirkulierenden Blutmenge. Er demonstriert die Pumpwirkung des Septum atrioventriculare uud erwähnt damit zusammenhängende Phänomene. Trotz verstärkter äusserer Pulsationen des Herzens kann dessen Schlagvolumen stark vermindert sein.

L. liefert den Nachweis für das Vorkommen eines normalen geringen respiratorischen Pendelns des Herzens und erörtert die Ursachen hierfür, sowie die Ursachen für das oftmals starke — inspiratorisch nach der kranken Seite gerichtete — Pendeln des Mediastinums, welches Phänomen u. a. bei Bronchostenose, Pneumothorax und Pleuritis zu sehen ist.

L. erörtert schliesslich die Ursachen der deutlichen Volumveränderungen, die das Herz bei Hindernissen für die Luftströmung von und zu den beiden Lungen aufweist.

SUMMARY

L. is discussing the effect of the respiration on the blood distribution within different vascular areas of the lung and within the heart and further, the effect of posture on the blood contents of lungs and heart and on the quantity of the circulating blood. He draws attention to the pumping effect of the atrio-ventricular septum and mentions phenomena associated therewith. In spite of increased external pulsations of the heart its effective volume may be strongly reduced.

He shows the occurrence of a normal respiratory slight oscillation of the heart and discusses the causes of this and further the causation of the often marked oscillation of the mediastinum, evident, among other conditions, in bronchostenosis, pneumothorax and pleurisy — inspiratory towards the diseased side.

He discusses the causes of the obvious volumetric changes exhibited by the heart on the air being obstructed to and from the lungs.

RÉSUMÉ

L'auteur discute l'action de la respiration sur la répartition du sang dans les différents domaines vasculaires du poumon et dans le cœur ainsi que l'action de la position du corps sur la quantité de sang des poumons et du coeur et cette même action sur la quantité de sang en circulation. Il démontre l'action aspirante et foulante du septum atrio-ventriculaire et énumère les phénomènes connexes à cette action. Malgré l'augmentation des pulsations cardiaques extérieures, son volume systolique peut être notablement diminué.

L'auteur démontre l'existence, à l'état normal, d'un mouvement pendulaire respiratoire de faible amplitude du cœur et discute les causes de ce phénomène ainsi que les causes du mouvement pendulaire du médiastin, souvent assez marqué que l'on observe notamment dans la bronchosténose, le pneumothorax et la pleurite, mouvement inspiratoire du côté malade.

Il discute enfin les causes des modifications très nettes de volume que subit le cœur dans les cas d'obstacles au passage de l'air vers le poumon ou hors de celui-ci.

URETHROGRAPHY AND PROSTATOGRAPHY

by

Sofus Widerõe, Ullevaal, Oslo

(Tabulæ XLII—L)

The radiological investigation of the urogenital tract was introduced by TUFFIER in 1897. He introduced metallic catheter in the ureter which he thereby succeeded in photographing. The renal basin was photographed with röntgen rays for the first time by VOELCHER and LICHTENBERG in 1907 and the male urethra by CUNNINGHAM in Boston, U. S. A. He injected on an empty bladder by means of a syringe 50 % of argyrol solution into the urethra. CUNNINGHAM obtained good pictures of the anterior urethra. Strictures which were present in that region appeared distinctly but a satisfactory view of the posterior urethra was not obtained.

In 1912 URAY demonstrated in Budapest urethral fistulæ by injecting a suspension of bismuth subnitrate, but also he was unsuccessful in obtaining good pictures of the posterior urethra.

BURKHARDT and FLOERCHEN in 1910 demonstrated the intravesical projection of the prostate after having injected air into the bladder. Similar investigations were made in 1914 by HYMAN and JACKES, but no exact investigation of the urethra and the bladder was made before the year 1920 when BLUM, EISLER and HRYNTSCHAK did so. About the same time PFISTER performed urethrography with barium sulphate as a contrast medium. He succeeded in some cases in showing the posterior urethra. Barium sulphate is no longer employed for fear of remaining particles of barium giving rise to the formation of stone in the bladder. In 1921 HAUDEK and PRIEGL called attention to the necessity of exposure at the time when the contrast medium was injected into the urethra if the posterior urethra was to be secured on the film. In the following years there were published a number of works in various countries. The Frenchmen SICARD and FORESTIER in the course of their investigations employed lipiodol (10—20 cms.) which diluted with equal parts of oil gave sharp pictures. Lipiodol does not irritate the mucous membrane. There have also been issued valuable contributions towards the understanding of the diagnostic importance of

urethro- and prostatography by the Mayo Clinic at Rochester. The largest and most important contribution, however, is that of KOHNSTAM and CAVE in 1925 (London). They have developed a technique to perfection.

After these historical remarks I will demonstrate some röntgen pictures which were taken at the second section of Ullevaal in the course of the last year. We employed a technique which is somewhat similar to that described by KOHNSTAM and CAVE. The investigation should be conducted when the bladder is empty. If residual urine is present, a preliminary catheterisation of the bladder is necessary. The patient lies half turned on his right side. The right lower extremity is greatly bent, the left stretched straight out. The side position is so chosen that a transverse diametre of the patient's body makes an angle of 60° with the table and with the film. The axis of the penis should be parellel with the body. As far as the arrangement of the radiography apparatus is concerned we followed the directions given by KOHNSTAM and CAVE which are here quoted in full.

»The tube stand should be on the opposite side of the table to the surgeon. In the postero- anterior position the tube is carefully centred over the bulb of the urethra by means of a pointer or other centering device. If the table is level, the central ray should be directed vertically downwards, while if the table is tilted, the tube also should be tilted to the same angle. The distance from the anticathode to the film should be twenty inches. In the oblique position the surface marking for the point of entry of the central ray is one inch below the middle of Poupart's ligament, the anticathode in this case being twenty four inches above the film. The size of the film used is of no importance provided it is large enough to include the base of the bladder as well as the urethra.«

Two exposures are sufficient, one in the postero-anterior and one in the oblique position.

The contrast medium is introduced by means of a syringe which has a urethral point. Exposure takes place during injection. By this method a good picture of the anterior urethra is obtained. For this there is required 25 ccm. of injection fluid. If it is desired to demonstrate the posterior urethra the method is as follows:

The injection fluid is syringed into the bladder, orificium urethrae is slightly compressed, whereupon the patient is requested to make water. At that moment exposure is made. In order to obtain a distinct picture of the posterior urethra, 50—100 ccm. of injection fluid are needed. If information is desired regarding the condition of the prostate, the patient is photographed lying on his back. During exposure the urethra is placed under tension.

KOHNSTAM and CAVE introduce the injection fluid from a glass cylinder under pressure which is measured by a manometer. They are thereby able to show when the fluid passes the sphincter and the bladder is filled.

Several different preparations are employed as a contrast medium, lipiodol, bismuth subnitrate (5 grs. of bismuth in 100 grammes of water), sodium bromide (20 %), potassium iodide (10 %), and silver iodide (5 % emulsion).

We have employed alternately sodium bromide (20—30 % solution), lipiodol and iodipin. Sodium bromide gives good pictures but the contours are feeble. The finer details, therefore, do not always appear clearly. Lipiodol and iodipin give very strong contours. As iodipin is considerably cheaper than lipiodol and gives just as good pictures, we have used it for preference.

Therefore, as a rule, we have employed iodipin for urethrography anterior and for urethrography posterior sodium bromide (30 % solution). As a rule the patients have suffered no discomfort on account of the strongly concentrated solution of sodium bromide. On a few occasions slight pains were felt after the injection. If the solution is removed within 15 to 20 minutes cystitic phenomena are avoided. Lipiodol and iodipin have not occasioned any irritation.

We have employed the technique here described and we are satisfied with our pictures. I take the liberty of demonstrating a number of them, but I will first show you a normal picture of the urethra.

Figure 1 shows the normal urethra in the postero-anterior position. The normal picture may show certain variations which may be due either to individual conditions or to a technical error in the picture. The bladder usually has convex borders downwards, but this line is not rarely more or less concave. It is the degree of the fullness of the bladder and its condition of contraction which determine these variations. Pars prostatica is not filled in the picture. Of pars membranacea only a little portion is seen which passes into the distinctly prominent bulbus region. Pars penile is seen distally from the latter.

Figure 2 shows the bladder and the urethra taken in the oblique position. In normal cases the base of the bladder is always curved with the convexity downwards. If the base is concave or flattened, we have a positive indication of a morbid process. The prostatic urethra appears in the form of a thin line stretching from the membranous urethra to the bladder. This line has a slight curve concave anteriorally.

I will now show you some radiograms from pathological cases.

In the radiographic examination of urethra we have to ascertain *strictures, false passages* and *urethral calculi.*

The strictures will be seen before treatment as a filling defect. The

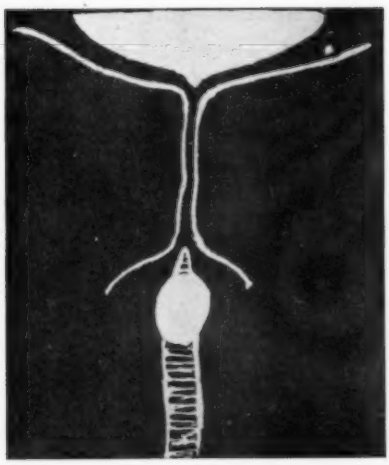

Fig. 1.

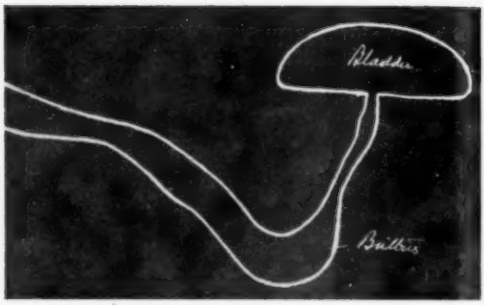

Fig. 2.

site of false passages and diverticula will also be seen on the urethrogram.

Figure 3 represents a traumatic stricture in the posterior part of urethra anterior. The picture was taken from a patient 68 years of age. 20 years previously he had a violent blow in perineum. There occurred haematuri with considerable extension of blood in perineum. He was confined to his bed for 8 days. 3 years later there occurred stricture phenomena. He then had to be treated at the hospital with dilating probes. Several years later he was again admitted for dilating treatment. In 1923 he was admitted for the third time and on that occasion he was operated, and urethrotomia externa was performed. A greatly constricted region in the posterior part of urethra anterior, about 2 cms. long was excised, and urethra suture was then performed. At the end of the treatment catheter No. 20 passed without difficulty. He was then free from symptoms for 3 years until the Spring of 1926. He then had to catheterise himself, at first two or three times a week, in the last weeks every day. 10 days before he was admitted there appeared symptoms of infiltration in perineum.

When he entered it was not possible to catheterise him and, therefore, there was performed suprapubic fistula. Subsequently dilating treatment was made with satisfactory results.

Urethrography anterior with sodium bromide was performed. The

urethrogram shows a large irregular diverticula which communicates with urethra anterior in its posterior part.

Figure 4. This picture represents a strictura urethra produced by gonorrhoea. The patient was a man 70 years of age who contracted gonorrhoea at the age of 38. Half a year later there were symptoms of stricture. Strange to say there were no specially unpleasant symptoms in connection with this stricture until 5 years ago. In January 1926 he became worse, and after dilating ambulatory treatment there appeared a boil in perineum and he was admitted to hospital. After 3 weeks treatment he was discharged with free urination.

On October 3, 1926, however, after some days of difficult urination, there again appeared infiltration in perineum and he had to be placed in hospital. On his arrival there was found an abscess in perineum. This was cut and pus was removed with malodorous urine. After careful treatment with stiff probes he was free from symptoms after two months treatment. In the anterior part on the urethrogram there will be seen several small strictures. A distinct diverticula extends right down towards perineum. Farther back at pars membranacea there is a slight periurethral diverticula. These discoveries give us a satisfactory explanation of the repeated occurrence of perineal abscesses.

Figure 5 also represents strictures in urethra. This patient was 48 years of age and he contracted gonorrhoea at the age of 28. During the last 8 years he had symptoms of stricture. In 1923, 1924 and 1925 he was treated in hospital with dilating probes. In January 1927 there was again increasing difficulty in urination until complete retention occurred, so that he had to be placed in hospital for the fourth time. As shown in picture 5 he had two strictures, one in bulbus urethra and one in pars membranacea. Iodipin was used for the urethrography.

Figure 6 was taken from a man 56 years of age with a gonorrhoeic stricture. During the last two years he has had symptoms of stricture of increasing intensity, and he came for treatment in February 1927. The picture shows an elongated stricture in pars anterior. Otherwise the conditions are normal.

Figure 7 also shows a stricture which arose on account of gonorrhoea. The stricture is here situated in pars membranacea. Behind the stricture pars prostateca is distinctly extended, a condition which is very frequently found behind strictures. Contours are otherwise normal. Sodium bromide was used as a contrast medium.

Figure 8 also represents a stricture. This patient who is now 47 years of age contracted gonorrhoea at the age of 30. Five years later there appeared symptoms of stricture which rendered treatment in

hospital necessary. In the following years he was repeatedly treated with dilating probes. The day before his arrival there occurred complete retention which made immediate admission necessary. On his arrival it was impossible to use the thinnest probe through the stricture. There was, therefore, laid a suprapubic fistula. Some time after urethrotomia externa was performed with resection of the stricture. He was then treated with probes up to No. 24, which finally could be inserted with ease. The picture was taken some time before he was discharged from the hospital.

In the picture there will be seen a slight constriction at the point of resection which is situated in the anterior region. From this there runs an irregular fistula, which can still be seen distinctly and which leads down to perineum. The patient was able to urinate without difficulty and without urine passing through the fistula whilst so doing. Sodium bromide was employed as injection fluid. In concluding my demonstration of the strictures with this picture I would quite briefly mention the most important points in the recognition of stricture of the urethra.

The sight of the stricture will be clearly shown in the urethrogram. Above the stricture there is usually dilatation.

The presence of false passages and diverticula will be seen in its full extent. This point is of special importance for subsequent treatment. The main part of spongy urethra is often involved in the cicatrial process. And this part of urethra has a smaller diameter and an irregular outline. The prostatic urethra is often filled irregularly.

Figure 9 shows a case of enlarged prostate. The patient is only 52 years of age.

During recent months he has exhibited typical symptoms of enlarged prostate. During the last few days urination has been very difficult, and then total retention occurred. The prostate is felt to be enlarged.

In figure 9, which was taken with the patient lying on his back, the left half of the prostate is seen to be larger than the right. The condition of the urethra is normal.

In figure 10 the same patient is seen photographed lying on his side. The base of the bladder is unchanged. The oblique view shows a hollowing out of the base of the bladder caused by the intravesical projection of the prostate. The prostatic urethra is increased in length.

The next picture is also one of an enlarged prostate. The patient who was 65 years of age was admitted with complete retention of urine after having had symptoms of the complaint for some weeks. Picture No. 11, taken in the anteria-posterior position, clearly shows

Fig. 3.

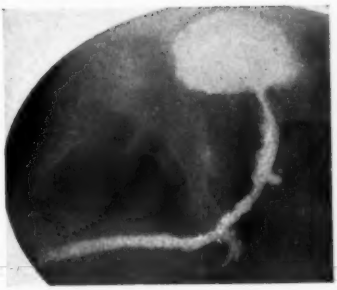

Fig. 4.

Fig. 7.

Fig. 9.

Fig. 10.

Fig. 5.

Fig. 6.

Fig. 8.

Fig. 11.

Fig. 12.

Fig. 13.

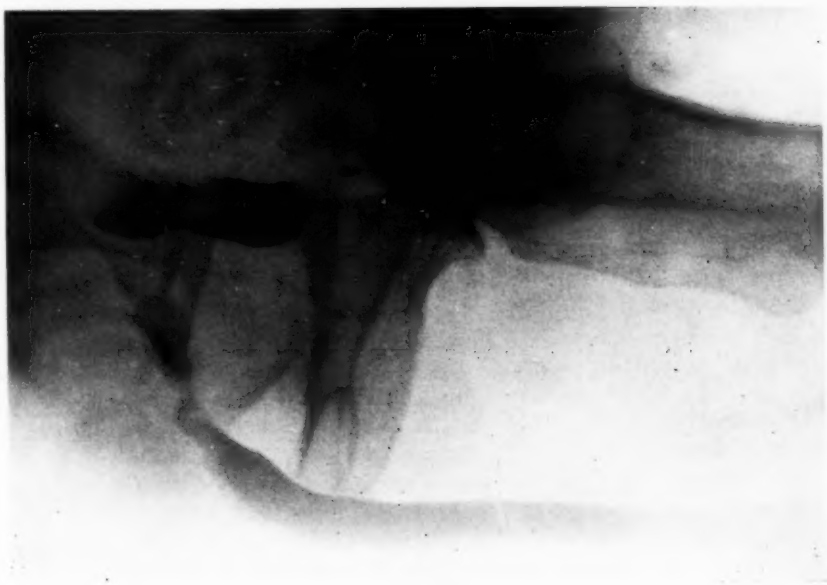

Fig. 14.

the enlarged prostate. The right lobe is most enlarged. The side picture 12 shows the enlarged prostate clearly. The hollowing out of the base of the bladder appears quite distinctly. There is also a distinct increase in length of the prostatic urethra.

The following two pictures were taken from a man 70 years of age on whom 8 years before prostatectomy was performed for enlarged prostate. After the operation he was free from symptoms until one month ago when he had difficulty in urination. He had to remain a long time before he could perform the act. In the course of this the bladder burst and the water stopped in the urethra. Once or twice there occurred complete urine retention.

He was admitted to hospital in April 1927 with retention of urine. It was found that a thick catheta could be inserted into the bladder without difficulty. After some days treatment with dilating probes he was discharged as improving. One month later he again appeared with the same symptoms, and acute retention rendered immediate admission necessary. It was not possible to find any strictures, nor was the prostate enlarged. There were no indications of cancer prostatæ. Wassermann's reaction was negative and symptoms of paralysis of the bladder were not present. The urethrogram appears to give an explanation of his retention of urine.

In figure 13, taken in the anterio-posterior position, the urethra is seen to be thin in pars membranacea, and it there shows a twisted course. The base of the bladder is distinctly hollowed out. Thus there is no recidivation of his enlarged prostate. Figure 14 taken with the patient lying on his side, also shows a narrow urethra. And it also has here a twisted course. In the course of urination, on account of the pressure, there has probably formed a lobe mechanism which has caused retention of urine. It is natural, according to this discovery, that no stricture was found on probing. Dilating treatment produced so marked an improvement that he could be discharged after 3 weeks treatment.

In conclusion I would make a few general remarks regarding the X-ray investigation of prostate. Before the X-ray photograph is taken the bladder should be empty. The contrast medium should be injected during exposure and only sufficient should be injected to outline the base of the bladder. Alterations in the base of the bladder are seen in the postero-anterior view. The hollowing out of the bladder will be seen in the oblique view. The length of the prostatic urethra will be increased, and a deviation of the course of the prostatic urethra on account of unequal growth of the enlarged prostate will be seen. The radiological investigation of the urethra and prostate has during

the last two years been employed in urethral and prostatic cases. With increasing personal experiences the results given by this method of investigation will be steadily more and more valuable. The radiographic examination of the male urethra and of the prostate should therefore be employed in all those cases where special information regarding the anatomical changes in the urethra and prostate are desirable.

SUMMARY

After a short view over the development of the urethrography and the prostatography the employed technique is related. The directions given by KOHNSTAM and CAVE are generally followed. The normal picture of urethra and prostate is shown. Further several cases of strictures, false passages and enlarged prostate before and after operation. At last is shown a case, where a lobe mechanism had caused the retention of urine.

ZUSAMMENFASSUNG

Nach einer kurzen Übersicht über die Entwicklung der Urethrographie und Prostatographie berichtet Verf. über die angewendete Technik. Dabei wurden im allgemeinen die von KOHNSTAM und CAVE gegebenen Direktiven befolgt. Der Artikel bringt ferner das normale Bild der Urethra und Prostata, mehrere Fälle von Strikturen, falschen Wegen und vergrösserter Prostata vor und nach der Operation und schliesslich einen Fall, bei dem eine Kappenmechanismus die Harnretention verursachte.

RÉSUMÉ

Après un bref aperçu sur le développement de l'urétrographie et de la prostatographie, l'auteur décrit la technique employée dans ces deux modes d'exploration. D'une façon générale, il s'est conformé aux directives données par KOHNSTAM et CAVE. Il donne l'image normale de l'urètre et de la prostate. Il communique ensuite certains cas particuliers de rétrécissements, de fausses routes et d'hypertrophie prostatique avant et après l'opération. Enfin, il communique un cas où la rétention d'urine était déterminée mécaniquement par un lobe qui s'était formé dans l'urètre.

FROM THE COUNTY CENTRAL HOSPITAL, MÖRBY, STOCKHOLM

PLASTIC RÖNTGENOGRAMS OF THE DIGESTIVE TRACT

Preliminary report

by

Erik Lysholm

(Tabulæ LI—LIII)

On using the ordinary methods in röntgen examination of the digestive tract tangential projections of the organs are as a rule obtained (silhouettes), and only in certain conditions do changes become evident in the anterior or posterior wall without turning the patient. By using a smaller amount of opaque substance, and eventually superposing it with air or some less absorbing material, and by turning the patient into different positions a perfect idea of the inner surface of the stomach can be obtained. Various methods for carrying out this examination have been suggested by BAASTRUP, RENDICH and others. All this methods, however, are very complicated and tedious, screening takes a long time and a great number of films have to be used if a precise examination is to be done. For the small intestine and colon such mode of procedure would not be practicable. It may be added that it is only in a contracted or partially distended organ that the condition of the mucous membrane is made evident. FORSSELL's (2) investigations into the movements of the mucous membrane have rendered these questions of great current interest and caused them to occupy the centre of röntgenology of the digestive tract. On the basis of FORSSELL's way of thinking it is desirable also to study the digestive tract while in a filled state, if possible without compression, thus altering the normal conditions of the mucous membrane. It is also important to

find simpler and cheaper methods for gaining knowledge of the inner surface under pathological conditions.

The present experiments were begun in 1925. For this purpose a model of a normal stomach was made by the aid of an apparatus previously described by the author (4). After this model a stomach in wood was subsequently made, fig. I. A number of holes of different depths, varying from 1 to 5 mm, were then drilled in this wooden stomach. In an ordinary glass-bowl a bottom of paraffin was moulded, in which shallow grooves were engraved, representing the folds of the mucous membrane.

These models were then filled with different opaque substances in different concentrations, after which the most favourable quality of rays was examined with different secondary diaphragms in order to arrive at a suitable technique for röntgen examinations in vivo. The different figures (1—2) represent partly ordinary photographs of the grooves, partly röntgenograms (figs. 3—4) after filling them with opaque substance, and it will be seen that the different elevations are as well represented on the röntgen picture as on the ordinary photographs. They appear as clearly defined as on the impress on a coin. The ultimate aim is to be able to demonstrate the moulding of the inner surface of the stomach with the same definition as the impress of a coin appears on a röntgen plate.

Below will be given a few examples of plastic pictures.

1) Different formations of normal mucous membrane (figs. 5—9).

2) Ulcer on the posterior wall of stomach. The crater was width of a pencil and very shallow. a) silhouette picture (fig. 10), b) plastic picture (fig. 11). On this can be seen the ulcer-crater, the large ridge of mucous membrane.

3) Large ulcer (fig. 12) in the lesser curvature with radiating highly elevated folds of mucous membrane, not to be demonstrated on an ordinary silhouette picture.

Gastro-enterostomies, small intestine and colon will be the subject of a communication at a future date.

The technique is very simple. I make use of a diaphragm of ÅKERLUND's design (1), especially constructed for rotating with a very great speed, thereby avoiding any undue lines on the pictures. The films are taken either in supine or prone position. In the former position the film is taken after controlling under the screen, by rotation of the patient, that the stomach has become well filled. Should this not prove successful, two, at most three pictures must be taken, centred through the corpus, fornix or canalis. The pictures in prone position are also taken after preliminary screening, so as to secure the most favourable position; it may be convenient to tuck up

with cushions on both sides so as to avoid compression through the spine. The usual series of films of the duodenal bulb in prone position may be taken on the same occasion, though the time of exposure must then naturally be reduced. The folds of the mucous membrane in the duodenal bulb come out exceedingly beautiful.

The quality of rays (100—150 kilovolt) and time of exposure must of course be varied within wide limits according to the quantity and density of the opaque substance on each occasion and the difference in elevation which is desired to demonstrate. As a rule the time of exposure should not exceed 0.8 seconds at 100—200 milliamp.

SUMMARY

With the purpose of bringing out the mucous membrane or pathologial changes on the anterior and posterior wall of the digestive tract when filled with opaque substance, the author describes a simple method by which plastic pictures can be obtained. The aim is to obtain a cast of the inner surface of the organ on the röntgen plate with the same definition as that obtained of the impress on a coin.

ZUSAMMENFASSUNG

Zur Darstellung von Schleimhaut oder pathologischen Veränderungen auf Vorder- und Rückseite der Innenfläche des Verdauungskanals bei gefülltem Organ gibt Verfasser eine einfache Methode an, mit deren Hilfe man plastische Bilder erhalten kann. Ihr Ziel ist, Abgüsse von der Innenfläche des Organes auf dem Röntgenbilde mit derselben Deutlichkeit zu erhalten, mit der die Prägung einer Münze auf einer solchen Aufnahme hervortritt.

RÉSUMÉ

L'auteur communique, dans le but de donner une image de la muqueuse ou des modifications pathologiques intéressant les parois antérieures ou postérieures des voies digestives à l'état de réplétion des organes, une méthode simple donnant des images plastiques. Le but de cette méthode est d'obtenir sur des radiogrammes une empreinte de la paroi intérieure des organes aussi nette que celle que donne à la radiographie l'empreinte d'une monnaie.

LITERATURE

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2. G. Forssell: Studies of the mechanism of movement of the mucous membrane of the digestive tract. Am. Journal, Febr. 1923.
3. B. Walter: Die physikalischen Grundlagen der medizinischen Röntgentechnik. Braunschweig 1926.
4. E. Lysholm: Röntgenoskopischer Modellierungsapparat. Xenia Forsselliana. Acta Rad. Vol. VII fasc. 1—6.

Tabula LI

Fig. 1.

Fig. 2.

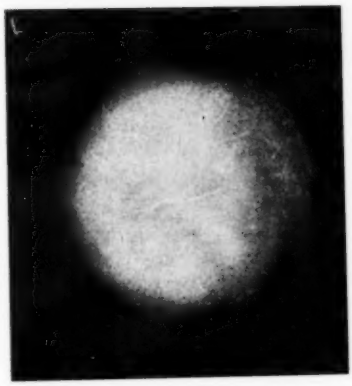


Fig. 3.

Fig. 4.

Fig. 5.

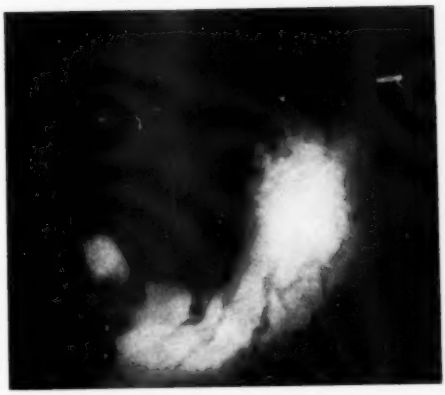


Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11.

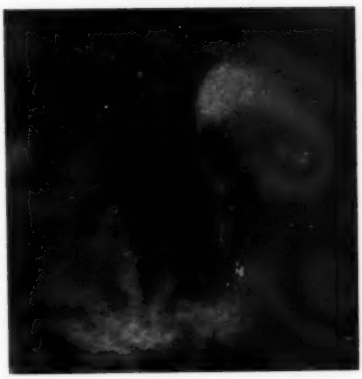
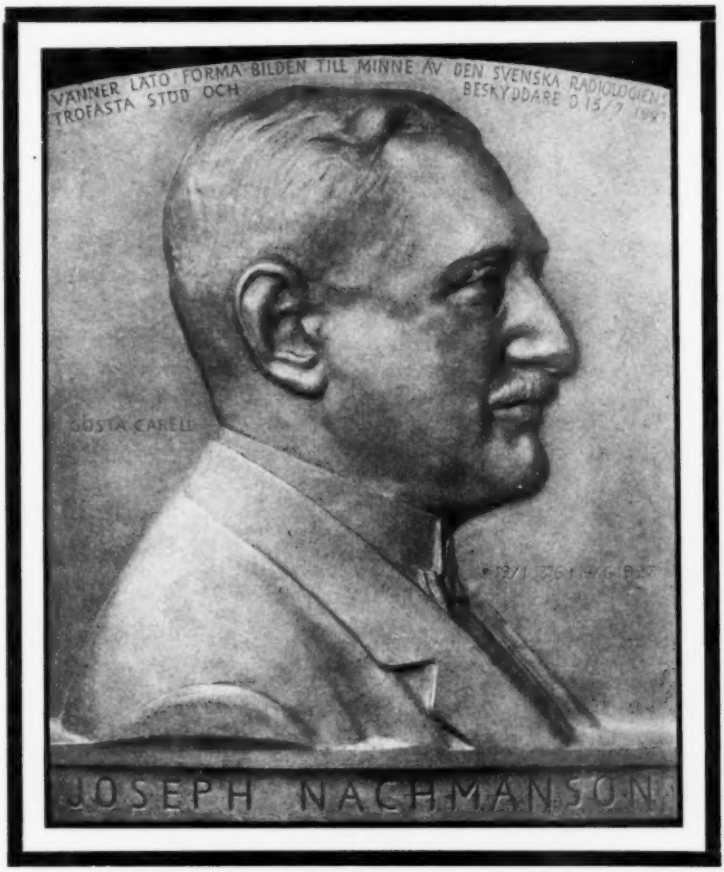


Fig. 12.


VÄNNER LÄTO FORMA BILDEN TILL MINNE AV DEN SVENSKA RADIOLOGIENS
TROFASTA STÖD OCH
BESKYDDARE D 15/7 1927
GÖSTA CARELL
JOSEPH NACHMANSON

†

JOSEPH NACHMANSON

* Jan. 12th, 1876. † June 13th, 1927.

In Memoriam

JOSEPH NACHMANSON was the head of one of Sweden's largest money-institutes — the »Stockholms Enskilda Bank» — and the record graven on his tombstone deals mostly with that most visible part of his public endeavour: with his work in the interest of commerce, industry and

finance. These lines shall pay a modest tribute to a part of his work which was done unobtrusively in a field remote from his every-day tasks and activities — his work in the service of medical science and research, and, more particulary, in the service of radiology.

JOSEPH NACHMANSON belonged to a family in which an interest in humanitarian problems, and especially in medical science, was deeply rooted for generations back. He used to say, himself, that the financier who conceives his task properly may be likened, in his very work, to a physician who, dealing with the social body, must possess at once the surgeon's calm courageousness to remove unhealthy growths and the skilled practitioner's methods for preventing, or by suitable measures healing, its possible ills. This double interest — in medical as well as in economical questions — made him particulary fitted to solve the problems with which he had to cope as honorary treasurer and financial adviser to the Stockholm Cancer Society and the Swedish Society of Medical Research. An incident resulted in his gaining a glimpse of the possibilities which the radium therapy opened for an effective dealing with disorders of a cancerous nature; and already at a time when that therapy was still in its infancy and little known, even by most physicians, he evinced the deepest interest in the new method for curing or mitigating the dread disease.

JOSEPH NACHMANSON possessed the gift — too rarely found in men of practical pursuits — to realize the value of purely scientific work as the indispensable basis for any practical accomplishment. He had, besides, the financier's capacity for viewing the phenomena in their wider relation; at the same time as he showed an unusual ability in mastering, even to its smallest details, the problem — hitherto unfamiliar to him — of caring for the sick. He took an interest in each and every member of the staff, physicians and nurses alike, who worked at the Radiumhemmet, and he went to the bottom of every task that confronted him in the work of organisation. He was a man in every sense of the word, imbued with lofty aims, and behind whose outward reserve beat a warm and generous heart.

Always ready with help himself, and personally contributing toward the expenses large amounts of which nothing was allowed to appear, NACHMANSON had also a wonderful gift of interesting others and enlisting their material help for the work. His word was the best guarantee that the cause was worthy of their support. That the Radiumhemmet stands to-day on a sound economical basis is largely due to his influence and wise counsel.

JOSEPH NACHMANSON was an honorary member of the Northern Association of Medical Radiology. Friends of him, and of radiology, have united in presenting to the Radiumhemmet the bronze plaquette reproduced above, wishing that the features of the man should be perpetuated for future generations to behold — in memory of his noble personality, and in grateful acknowledgment of his important contribution toward the development of radium therapy in the service of those who suffer from cancer.

Gösta Forssell.

SECOND INTERNATIONAL CONGRESS OF RADIOLOGY

STOCKHOLM, JULY 23RD TO 27TH, 1928.

Patron: H. R. H. the Crown-prince of Sweden.

President: Professor Dr. GÖSTA FORSSELL, Hon. Secretary-General: Dr. A. RENANDER, Hon. Treasurer: AUG. NACHMANSON, Esq.

Congress Committee:

Dr. G. ANDRÉN, Dr. E. BERVEN, Dr. L. EDLING, Dr. E. HAGBERG, Dr. N. HANSSON, Dr. M. HEDENBERG, Dr. J. HEYMAN, Dr. G. HOLMBERG, B. E. JÄRNH, Esq., Dr. A. LUNDQVIST, Dr. E. LYSHDLM. Dr O. SANDSTRÖM, Dr. R. SIEVERT, Dr. M. SIMON, S STRINDBERG, Esq., R. THORÆUS, Esq.. Dr. A. WESTERGREN, Dr. N. WESTERMARK, Dr. Å. ÅKERLUND.

MEMORANDUM

Days of Congress

The Radiological Exhibition will be opened in the forenoon of Monday, July 23rd. In the evening there will be a general reception.

The proceedings will commence in the morning of Tuesday, July 24th, and be continued on Wednesday, Thursday and Friday, July 25th to 27th.

Sections

The proceedings will comprise Roentgen Diagnostics, Radiotherapy (Roentgen-, Radium- and Heliotherapy), Medical Electrology, Radiophysics as well as discussion on Instruction and Training in Medical Radiology and will be divided into different sections.

Membership

Prospective participants in the Congress should apply to the Secretary General enclosing a fee of 40 Swedish Crowns.

Upon receipt of this notification the Secretary-General will immediately forward a membership card.

The membership card will be valid as passport for Sweden for congress members and their families.

It is desirable that the attached notification form should be sent *at as early a date as possible* to enable an approximate estimate of the number of members so that arrangements can be made for their comfort.

List of Members

The Organising Committee is planning the issue of the list of members in the form of a *portrait-catalogue*. In order to render this collection of portraits of the members of the Second International Congress of Radiology as complete as possible the collaboration of the members is requested. Members will therefore kindly forward their portraits in good time, preferably together with the notification form. Please state on the back of the portrait name, year of birth, principle appointment and place of residence. It is intended to insert those data in the portrait-catalogue.

Papers

Papers should be notified to the Secretary-General before the 1st of January, 1928 (those from the United States and Canada to Prof. George E. Pfahler, 1321, Spruce Street, Philadelphia, Penn.).

A typewritten summary of the paper, either in English, French or German, not more than 1 (one) page octavo (400 words) should be submitted to the Secretary-General not later than the 1st of March, 1928. The summaries submitted before the stipulated date will be put into print prior to the Congress and presented to the members.

Each author is restricted to the reading of two papers.

The time for an address must not exceed 15 minutes.

Should it prove necessary in the interest of the Congress, the Board of Management reserves the right to limit the number of papers.

The Board of Management will in addition invite certain authors to give summary addresses on different branches of radiology and will arrange a series of papers on instruction and training in Medical Radiology, particularly in reference to the experiences gained in the different countries.

The question of establishing an international unit for dosage of Roentgen Rays, as well as the question of general principles for protective measures, will also be subject to discussion during the proceedings.

Radiological Exhibition

In conjunction with the Congress an exhibition will be arranged in the Art Galleries (Liljevalchs Konsthall), comprising apparatus and appliances of interest to members of the Congress.

The exhibition will be kept open every day of the Congress.

Special hours are reserved on the programme for demonstration of exhibits.

Prospective exhibitors should give notice of their participation not later than January 1st, 1928.

Full particulars regarding the exhibition and application forms may be obtained from the Secretary-General.

Accommodation

The Accommodation Sub-Committee undertakes to engage rooms for the members of the Congress in hotels or boarding-houses.

The Secretary-General will furnish members with particulars concerning prices etc. together with an application form for rooms. Such particulars will also be forwarded to prospective members on request.

Rooms, however, will only be reserved for those who have returned their application forms before May 31st, 1928.

Travel

Members will themselves arrange their journey to Stockholm.

The Travel Bureau of the Swedish State Railways, which will have a branch office at the Congress Bureau for the service of the members of the Congress has offices in the following cities:

London, W. 1. Swedish Travel Bureau, 21 Coventry Street. Telegrams: Suedecus.

New York. Swedish State Railways' Travel Information Bureau, 52 Vanderbilt Ave. Telegrams: Swedtravel.

Berlin, W. 8. Schwedisches Reisebureau, Unter den Linden 22—23. Telegrams: Swedticket. Reisebureau Nordland, N. 4, Invalidenstrasse 115. Telegrams: Flinkfertig.

Paris. Excursions en Suède, Avenue de l'Opéra. Telegrams: Suedecus.

Amsterdam. Officieel Reisbureau der Zweedsche Staatsspoorwegen Louis Hannell, Visschersdam 7. Telegrams: Hannellreis.

Copenhagen. Sveriges Statsbanors Sovplatscentral, Hovedbangaarden. Telegrams: Sovecent.

These branches of the Swedish State Railways' Travel Bureau will, upon request, arrange tickets for parties to the Congress.

The address of the *Swedish American Line's* office in New York is as follows: Swedish American Line, 21—24 State Street, New York.

During the Congress the above mentioned branch office at the Congress Bureau will be at the service of congress members with information regarding travelling in Sweden and trips in the surroundings of Stockholm.

Suggestions for such trips and for a party tour in Scandinavia after the Congress will be submitted later to the members.

The Travel Bureau of the Congress will also, if requested, furnish advice and information regarding arrangements for the return journey. Congress members should, however, in good time, preferably when fixing their route, make certain of their return tickets, particularly cabin tickets on the steamers.

Social Entertainments

Monday, July 23rd, Members and ladies are invited to a reception at Berns Restaurant.

Tuesday, July 24th, the City of Stockholm will entertain the members and ladies in the Town Hall.

Wednesday, July 25th, subscription dinner at the Grand Hotel Royal.

General Information

The Congress will be held at the House of Parliament.

The Congress Bureau will include:

General Information Bureau;
Post Office;
Postal Boxes;

Each member will be given a pigeon-hole marked with his congress number. Documents pertaining to the Congress will be deposited here. Postal matter will also be assorted in these pigeon-holes if addressed: Second International Congress of Radiology, Stockholm.

Bank and Money Exchange;
Telegraph Office;
Travel Bureau;
Reading and Conversation Room;
Typists' and Stenographers' Room;
Refreshment Room.

A ferry-boat, stationed at the quay below the House of Parliament, will leave every halfhour during the proceedings for the Exhibition Hall, situated in the neighbourhood.

Special arrangements will be made for luncheons. Luncheon tickets may be obtained at the Congress Bureau.

Address

All postal matter should be addressed to:

The Secretary-General, Second International Congress of Radiology, Sophiahemmet, Stockholm, Sweden.

Telegrams and cables: *Radiology*, Stockholm.

Telephone (until further notice): Stockholm, Kungsholmen 60 11.

Announcement of further details will be confined to members only, unless specially applied for.

Stockholm, December 1927.

GÖSTA FORSSELL.
President.

AXEL RENANDER.
Secretary-General.

TEACHING IN MEDICAL RADIOLOGY
MAIN SUBJECT OF THE SECOND INTERNATIONAL CONGRESS OF RADIOLOGY

In the Roentgen rays and in the radiating matter medicine has found a means for diagnosis and therapy which has become indispensable for the healing art and which is growing in importance every day. Through research and systematic elaboration of gained experience roentgen diagnostics no less than radiotherapy have developed into extensive scientific specialities with their own working methods. In practical medicine radiology has in fact acquired a secure position as an independent discipline with its own institutions, lead by specially trained radiologists. At the same time as medical radiology has developed and greater and greater tasks have been allotted to it, it has become clear to the representatives of practical medicine no less than to the universities that a thorough special instruction and training in medical radiology is essential, not only to those intending to devote themselves entirely to radiology but also to specialists in different branches of medicine to whom radiology constitutes a necessary accessory science. The conviction that a survey of medical radiology should also be included in the general medical curriculum has more and more gained in force.

The organisation of the instruction, however, has not in all countries kept time with the development of radiology in medicine and the question of suitable forms of instruction and training in this science is everywhere on the programme.

The Executive Committee of the Second International Congress of Radiology to be held in Stockholm July 23rd—27th, 1928, has therefore resolved to take up *instruction and training in medical radiology* as the main subject of the Congress, medical radiology to include roentgen diagnostics and radiotherapy with its sub-divisions, roentgen-, radium- and heliotherapy.

Primarily the Committee had decided to invite a few representatives only from some of the biggest radiological societies to put forth the experiences gained on this question and to make suggestions for the organisation of the teaching and special training in medical radiology.

No sooner did it become known, however, that the question of instruction and training in radiology would be taken up at the Congress than a wish was expressed from different quarters that the Congress should take up this great problem as extensively and completely as possible. This question of instruction is evidently acute in all countries where radiology has reached a certain degree of development. The teaching, however, requires different forms of organisation in different places according to, inter alia, the existing organisation of medical instruction and hospital service, as well as to financial means.

We have therefore considered it advisable that the question of teaching should be taken up on a wider basis and that the Congress should collect instructive material concerning radiological teaching in the whole world. We have thought the best possible result to be attained by inviting a lecturer on medical radiology, from each of those countries where organised instruction in medical radiology is known to exist to give a short account of the historical development of the present organisation of radiological teaching and training in the country to which he belongs, and to put forward views and suggestions for the organisation of instruction and training in medical radiology for students as well as for those wishing to take up special branches of radiology.

All these papers will be published immediately after the Congress as a separate volume of the proceedings and will constitute an important source of information and stimulus for all those teachers and authorities responsible for the organisation and further development of radiological teaching.

At a common session immediately after the inauguration of the Congress brief extracts — not exceeding 15 minutes — of as many of these papers as time will permit, will be read. The Committee reserves the right to decide the order of these oral extracts and to limit their number.

By the arrangement suggested the question of radiological teaching is likely to be elucidated as extensively and thoroughly as possible. Time will not permit of any discussion after these papers. However, to give also others but those specially invited to speak on the subject, an opportunity of bringing forth their views on the organisation of radiological teaching, written contributions to the discussion in English, French or German, not exceeding one octavo page (400 words) will be accepted and published in the special volume of the proceedings, if received, latest, on the last day of the Congress.

GÖSTA FORSSELL.
President.

Axel Renander.
Secretary-General.

EDITORIAL

Our American representatives, Messrs. PAUL B. HOEBER, Inc., New York having decided to confine themselves to their own publications, the Editor of the Acta Radiologica has resolved on overtaking himself the distribution and the management of the review also for the United States. We thus ask our American subscribers from now on kindly to send in their subscriptions, $ 7 per volume, directly to the Acta Radiologica, Tryckerigatan 2, Stockholm, Sweden.

PROCEEDINGS

OF THE

NORTHERN ASSOCIATION OF MEDICAL RADIOLOGY

(— NORDISK FÖRENING FÖR MEDICINSK RADIOLOGI —)

AN ACCOUNT OF THE FIFTH CONGRESS OF THE ASSOCIATION,

HELD IN THE MEDICAL AUDITORIUM OF THE RIGSHOSPITAL, COPENHAGEN, JUNE 30th to JULY 2nd, 1927.

Edited by

Chr. I. Baastrup, Secretary-General

LIST OF OFFICERS.

President: Dr. H. J. PANNER.
Honorary Presidents: Prof. GÖSTA FORSSELL, Dr. S. A. HEYER DAHL, Dr. G. A. WETTERSTRAND.
Secretary-General: Dr. CHR. I. BAASTRUP.
Secretaries: Dr. Å. ÅKERLUND, Dr. G. JANSSON, Dr. A. W. SCHIANDER, Dr. P. FLEMMING MØLLER.

Minutes of the Fifth Ordinary Meeting of the Northern Association of Medical Radiology,

held at the Rigshospital, Copenhagen, June 29th, 1927.

1. The President, Dr. REYN, being prevented by illness from attending, the Chair was taken by the Vice-President, Dr. PANNER, as acting President.

2. Dr. PANNER spoke in memory of Dr. RUSSELL D. CARMAN and JOSEPH NACHMANSON Esq., honorary members of the Association, deceased since the meeting of the last Congress.

3. *Resolved*, a) that henceforth the Northern Association of Medical Radiology shall, every fourth year, hold a joint meeting with the Northern Society of Surgeons, and that, in so doing, the Association shall follow the turnus established by the said Society;

b) that there shall, in so far as possible, be selected beforehand, for discussion at such meetings, a subject calculated to be of common, mutual interest to the members of both bodies concerned; without such selection being nevertheless considered as constituting an irrevocable condition for a fruitful collaboration between the two said bodies;

c) that the selection of any subject for joint debate shall be a question for deliberation between the respective Presidents and Secretaries-General of the two said bodies, their decision subsequently to be submitted to their respective Councils for final approval; each body thereupon appointing one of its members to introduce the said debate on its behalf, and each body separately defraying the cost of having its member's introductory paper printed; the privilege of eventually publishing in their respective *Acta* those papers, as well as any matter presented in the discussion appertaining thereto, remaining open to both bodies alike;

d) that such persons as are members of both the said bodies shall pay the full congressional fee to both; while those who are members of only one or the other of the said bodies shall enjoy the privilege of free admission to the meetings of the body in which he, or she, holds no membership, but shall be entitled to receive the printed publications of that body only on payment of the ordinary price demanded from the public for such publications;

e) that the next meeting shall be held at Oslo, in 1929.

4. *Resolved*, to approach the Northern Society of Internal Medicine with a view to establishing a collaboration by which, in the future, every second Congress of the N. A. M. R. would take the form of a joint meeting with that body.

5. *Resolved*, that the election to the office of Secretary-General of the N. A. M. R. shall be for a term of four years each time.

To hold that office for the next four years is elected Dr. CHR. I. BAASTRUP, Copenhagen.

6. *Resolved*, that it shall be a condition for Membership in the N. A. M. R. that the person retaining, or applying for such membership is a member of the scientific Radiological Society of his own country;

that the annual fee for Membership in the N. A. M. R. shall be the sum of 10 (ten) kroner;

that a special »congress-fee» shall be paid by all members attending any Congress held by the Association;

that no person who is not a member of the N. A. M. R. shall be entitled to be a speaker, or to take part in the discussions at any Congress of the Association;

that admission to attend the meetings of the Association shall be open, subject to application granted by the Council, to all assistants and nurses from roentgen clinics, and to all medical students.

7. *Resolved*, that Prof. GÖSTA FORSSELL (Sweden), Dr. S. A. HEYERDAHL (Norway) and Dr. G. A. WETTERSTRAND (Finland) be elected Honorary Presidents of the Congress of 1927.

8. *Resolved*, that Dr. CHR. I. BAASTRUP be elected Secretary-General of the Congress, and Dr. ÅKERLUND (Sweden), Dr. JANSSON (Finland), Dr. SCHIANDER (Norway) and Dr. FLEMMING MØLLER (Denmark) Secretaries.

9. *Resolved*, that *forty-five* minutes be allowed for each of the opening papers to be read, respectively, by Dr. BAKKE, Dr. BERVEN, Dr. JANSSON and Dr. KREBS; as well as for the reading of a paper, by Dr. LAURELL, at the joint meeting with the Members of the Medical Association;

that *fifteen minutes* be allowed for every one of the other papers to be read, and *five minutes* to each speaker taking part in the discussions.

10. *Resolved*, that the papers read, together with a full report of the Transactions of the Congress, shall be published in the *Acta Radiologica*.

11. *Resolved*, that the Members-of-Council from each country shall designate one Member of the N. A. M. R., from their own nation, who will accept to present an opening paper at the next Congress, in 1929; the choice of subject for such paper to be free.

All Resolutions adopted as above.

CHR. I. BAASTRUP, Sec'y-General.

Scientific Transactions

I. S. Bakke, Bergen: On Utero-Salpingography

In the course of two years, the author has examined 112 patients by the process of lipiodol injection into the uterus and tubes. As a result, there was found to exist, at the angle of the uterus, a sphincter (demonstrated at the meeting of the Norwegian Society for Medical Radiology, May 5th, 1926) separating the contrast-fluid in the uterus from that in the tubes. The anatomical substratum for the said sphincter was found, too, and was ascertained to be a circular bundle of muscular fibers. There were also observed various forms of peristalsis both in the uterus and the tubes. In the former, the peristaltic movement was chiefly of two kinds: one seeming to have for its object the evacuation of the uterine contents into the vagina, the other its evacuation into both of the tubes. The form of the peristaltic movement for evacuation into the vagina can vary. Sometimes there will be a circular contraction of the uterus just below the angles of junction with the tubes; at other times it is only one of the angles, with the part of the uterus below it, that will be contracted. This peristalsis causes the cervical canal to open; which can be noticed, among other things, by the fact that the cannula resting in the cervix suddenly lies quite loose, instead of being gripped and held tightly by the latter, as before.

The evacuation of the uterine contents through the tubes is effected by the uterus itself. If the tubes are the seat of any pathological changes the case may, of course, be different; but if they are open and healthy there will be quite a considerable quantity of lipiodol in the peritoneal cavity already 10 minutes after the injection has taken place. On radiographs taken in series it can be very nicely observed how the uterus rhythmically propels its contents into the tubes. But in order to get this to show clearly in the pictures it is necessary to inject only small quantities of the lipiodol — not more than 0.5 to 1 c. c. — at the time. If large quantities — 3 or 4 c. c. — are injected at one time it is quite likely that no peristaltic movement will be seen at all.

The cases examined by the author fall into four main groups: a) those in which both the uterine cavity and the tubes were normal; b) cases with pathological changes in the cavity and walls of the uterus; c) cases of salpingitis; d) extrauterine and extratubal disorders.

In all cases, the examination was preceded by a virulence test of the vaginal secretion, to avoid the risk of encountering bacteria in a virulent state; in

other words: an effort to guard against complications following the injection. In no instance were there observed complications of any kind.

Of intrauterine changes, the author has shown the presence of very small placental polypi, hardly as large as a pea, and of placental remnants about as large as a thumb. The very small remnants of old placenta produce hardly any change in the cavity of the uterus. On the other hand, the volume of the cavity — whose normal capacity is about 4.5 c. c. — changes very considerably, and can reach a capacity of as much as 30 c. c. As regards the demonstration of early pregnancy, it is a question whether such a demonstration is permissible at all, seeing that it involves the introduction, into the cavity of the uterus, of a foreign substance which will probably lie there for a considerable length of time. It has, indeed, been observed to remain there for as much as three weeks. All the cases examined by the author had been admitted to the hospital for the purpose of having the pregnancy interrupted on other medical grounds. The case of earliest pregnancy observed by him was one of 4 weeks; but Dr. HEUSER states that the method can demonstrate pregnancy as recent as the 1st or 2nd weeks.

A feature common for all the gravid uteri is that they have lost their normal tonus. The same applies, to a certain extent, to the cases where the patient is in the premenstrual period. This fact, of the gravid uterus losing its normal tonus, is a very important indication for the differential diagnosis against myoma uteri. The author demonstrated six cases of the latter disorder, some of them submucous, others intramural or of mixed character.

Salpingitis cases form the bulk of the material coming under observation at a municipal hospital. The author has 39 such cases. The two cardinal symptoms denoting the existence of this disorder are: *either* a complete or partial absence of the tube shadow, together with the failure of the contrast fluid to evacuate into the peritoneal cavity; *or else* rigid, immobile tubes, with retarded evacuation into the peritoneum. The proper way to proceed is to inject first a very small quantity of lipiodol — about 0.5 c. c. — and then to wait and see if the uterus itself propels this out into the tubes. If it fails to do this, it may mean the existence of a salpingitis, but it does not necessarily mean that the tubes are closed up; for, of course, there may very well be salpingitis which doesn't cause any occlusion of the tubes. On the other hand, there have been cases in which the tubes, on operation, were found to be to all appearances normal, but where we extirpated them anyhow, because the salpingography had shown them to be closed up; and it invariably proved that such tubes were the seat of a chronic salpingitis. At the same time, I do not wish these words of mine to be taken as expressing any judgment as to whether it is justified or not to extirpate a tube that on operation has been found to be apparently normal, even though the salpingography may have shown it to be closed up. That the tubes can remain open, even after a serious salpingitis, is something of which the author himself has seen several examples.

Screening, as part of the utero-salpingography, plays a considerably larger rôle in the case of extrauterine and extratubal disorders, than in connection with salpingitis. By displacement of a tumor it will be possible to see how a pull is exerted on the tube in case the tumor is adherent to the latter, as, for instance, in the case of ovarian, parovarian or intraligamentous cysts. By bimanual exploration it will be possible to ascertain more or less exactly the

relation of an existing pelvic tumor to the uterus and the tubes, seeing that the utero-salpingography has made the latter visible.

The only contraindication which the author has respected is that of any existing acute annexal disorder.

Discussion:

1. J. HEYMAN, Stockholm: As a gynecologist, I have looked with the greatest interest at the beautiful radiographs shown us by Dr. BAKKE. Though not an expert on the subject of roentgen technics, I venture to believe that they are among the finest ever published. There is no doubt but that utero-salpingography is very valuable as a means of clearing up several interesting *theoretical* questions, and that in a number of cases it may help us to a more minutely exact diagnosis; but the roentgenologists must make it clear to themselves that the cases in which the examination by means of lipiodol is of any *practical* value for the diagnosis are probably very few.

As regards the first group — and the one which has been the object of the greatest general attention — namely, the sterility cases, it is my opinion that no great weight attaches to the question as to which method is preferable: lipiodol examination or pertubation with air. Either of them enables us to diagnosticate a closed condition of the tubes and, thus, gives us the possibility of avoiding a laparotomy in cases of sterility with open tubes. That is an advantage, of course; but the practical importance of the diagnosis is much reduced by the fact that the intervention which must be the natural result of the diagnosis — namely, a laparotomy and the opening of the tubes by operation — will hardly give the patient a better chance of restoration to normal conditions than she has of winning the great prize in the lottery.

Another large group is that of the intrauterine changes, like the placental polypi, myomata, carcinomata of the corpus uteri, etc., which Dr. BAKKE has just shown us. In nearly any cases of this kind which it is found impossible to diagnose on the basis of the anamnesis and palpation alone, the operative intervention that may be necessary in order to obtain the diagnosis will be just the same as the one we shall have to employ, anyhow, as a matter of therapy—namely, curettage. In that connection, the lipiodol examination, therefore, becomes an unnecessary feature. Yet, in my opinion, it is within this very group of cases that the method will have its greatest value; namely, as a means of proving the existence — or non-existence — of a submucous myoma. When it becomes a question of chosing between roentgen treatment and operation, and when it becomes desirable to ascertain that there doesn't exist any submucous myoma contraindicating radiological treatment, then the lipiodol examination should certainly be a simpler and less dangerous method than digital exploration of the uterine cavity.

In the third group — that of the annexal disorders — I have not personally, since the method came up, had any case in which I have felt tempted to try clearing up a doubtful diagnosis by means of a lipiodol examination.

2. Dr. BAKKE: I quite agree with Dr. HEYMAN concerning the value of the method as a means of demonstrating the presence, or non-presence, of submucous myomata, when it is a question of whether roentgen treatment should be instituted or not; and as to its value in regard to salpingitis and resulting sterility I wish to say that, in my opinion, it is far superior to

pertubation. Utero-salpingography, namely, makes is possible to see whether both tubes are closed, or only one; and that is something which cannot be ascertained by pertubation. The same is the case when it comes to appraising the possibilities of overcoming the sterility. Here, the lipiodol examination makes it possible to judge how large a lumen one has to do with for plastic operation; something of which pertubation will not give the slightest hint or indication.

II. Å. Åkerlund, Stockholm: Later Experiences Concerning the Niche Diagnosis in Cases of Duodenal Ulcer[1]

The niche diagnosis in cases of duodenal ulcer has made great advances of late, thanks to the routine application of the technique — which, it is true, has not yet been adopted everywhere — of *direct bulb compression*; a method which permits one to study closely the surface conformation of the bulbar wall.

The direct compression should be applied and graduated under screen control. The direction of the pressure should not be made dependent on that of the projection. The simplest way of compressing the bulbar area is by means of cotton-, cork- or aluminium pads, placed between the cassette-holder and the patient.

The bulb compression not infrequently makes it possible to demonstrate small and superficial niche formations ("en-face niches", "niches in relief") within the bulbs, which without compression appear entirely or almost normal roentgenologically.

The compression of a deformed bulb will often bring out the hitherto invisible niche, against which folds of the mucosa converge.

Niches on the anterior or posterior wall of the bulb ("niches in relief") are nowadays much more frequent than the so-called "classical" contour-forming niches on the lesser curvature side with corresponding deep incisurae on the opposite side; a fact which is probably due as much to the altered technique as to different conditions in the material observed.

The compression method rather often makes it possible to demonstrate the existence of *multiple* ulcers.

Thanks to the compression method the demonstration of bulbar niches has become far more frequent than before even in exceedingly early stages. In practically every case where it has been possible to check the findings by operation or autopsy the niche roentgenologically diagnosed has proved to correspond, anatomically, with a crateriform ulcer.

Discussion:

G. Forssell, Stockholm: From my own experience I wish to confirm the observations made by Dr. Åkerlund, concerning the value of the direct compression method for roentgenological diagnosis of duodenal ulcers. Since

[1] Published in extenso in this number of the *Acta Radiologica*.

the time of ÅKERLUND's first publication on the subject I have used direct bulb compression in a great many cases, and to a steadily increasing extent. In recent years, it has been my usual method in all the cases in which the typical ulcus deformity did not reveal itself to the usual technique.

III. Lars Edling, Lund: A Case of Syphilis of the Duodenum [1]

A man 38 years old, hitherto in good health, had for three months been troubled with attacks of vomiting, and with strong, persistent pains in the epigastric region, though not in direct connection with his meals.

On roentgen examination, the stomach was found to be fairly normal, but the bulbus duodeni was transformed into an infiltrated tube, as broad as a finger, about 6 cm. long, with a slight concavity upwards. There was no stenosis either in the pylorus or in the duodenum, but there was a sharp demarcation at the point where this transformed portion passes into the second, descending part of the duodenum. There was no retention in the stomach.

Syphilis being suspected, a Wassermann's test was made. It proved strongly positive; whereupon the patient, questioned on the subject, admitted that he had, in fact, had syphilis fifteen years before. He was then given a strong antisyphilitic treatment, whereupon the stomach symptoms disappeared.

Renewed roentgen examination now showed a change of the bulbus duodeni, in direction of the normal. It became distended and emptied itself periodically, but was still somewhat infiltrated, though it had lost its tubular shape. As the Wassermann still continued positive, the antisyphilitic treatment was gone on with.

The picture of the duodenum is different both from ulcer and from the known tumoric changes in that organ, and should undoubtedly be interpreted as a syphilitic duodenitis— or, possibly, periduodenitis. As far as the author knows, it is the first of that kind described.

IV. David Ottosen, Copenhagen: One Hundred and Sixty-Four Cases of Diseases of the Biliary Tract Cholecystographed and Operated on (J. Case)

The speaker gave a detailed description of the technique and the reactions. The following grouping of the Graham test reports had been used:

1. *Stone positive* (the stones giving direct shadows; or else, negative stone shadows);
2. *Straight positive* (no gall-bladder shadow);
3. *Negative, normal* (normal gall-bladder outline, dense shadow, no defects in

[1] To be published in extenso in a coming no. of the *Acta Radiologica*.

shadow; disappearing nearly, if not completely, in 3 hours after a meal containing fat);

4. *Pathological, non-calculous* (no stones recognised, but gall-bladder shadow imperfect as to one or more of the following: form, density, emptying).

Under those four groups, the cases divide themselves as follows:

	No. of cases operated on	Error	Reliability
Gall-stone positive	46	3	93.5 per cent.
Straight positive	46	2	95.6 —
Negative (normal)	21	2	90.5 —
Pathological, but non-calculous	51	5	90.2 —
	164	12	92.7 per cent.

The speaker dwelt at length on the cases of erroneous diagnosis within each of the groups, and spoke in particular detail of the findings in the »straight positive» cases.

Stones were found in 4 cases belonging to the groups »pathological n-c.» and »normal:» reliability, consequently, 94.5 per cent. The number of cases found stone-positive on operation was 78. In regard to these, the Graham test report had been »straight positive» in 31 cases, »stone positive» in 43, »pathological gall-bladder, but non-calculous» in 4 cases; reliability percentage, consequently, 95 per cent.

While, before the introduction of Graham's test, the roentgen diagnosis of gall-stones was possible in about one third of the cases that were operated on (CASE, CARMAN, and others), it is now possible, by the aid of cholecystography, to diagnose both stones and other disorders of the gall-passages with an exactitude — as controlled by operation — of at least over 90 per cent.

The speaker illustrated his report by demonstrating a number of skiagrams, partly of normal, partly of pathological gall-bladders.

Discussion:

1. DR. SVEN ELDH, Stockholm: I have tried to form an opinion of the method from a medico-clinical point of view and have collected, to that end, the cases in which we have used it at the Serafimer Lazaret. They are 57 in all. We have generally used the proceeding of ingestion by mouth, with sodium tetraiodide. Nine cases have gone to operation. Of those, there are a couple which are particularly illuminative with respect to the value of the method. In them, the operation had been undertaken on the basis of a clinically very pronounced disorder of the gall-passages, and the gall-bladder was found to be absolutely normal. The roentgenologist, too, had made out the gall-bladder to be in every way normal.

A point which it seems to me has not been paid sufficient attention to, in connection with cholecystography, is the fact that a normal, unimpaired functionating of the liver is an absolute condition for the greatest possible reliability of the examination. At the Serafimer Lazaret we have, in connection with intravenous application of the contrast fluid, made tests of the liver functions ad modum KUNFI.

2. Dr. OTTOSEN: I think it is rather generally agreed that the liver function has to be very much reduced before the fact will have any influence on bringing out the gall-bladder shadow; and, as regards the liver-function tests, we must, of course, be careful not to attach too great an importance to them. GRAHAM has indicated a new compound, phenoltetraiodophtalein, with which it is possible to make a liver-function test and cholecystography at the same time. Besides, this new formula is said to have the advantage of giving fewer reactions than the tetraiodophenolphtalein salt; but unfortunately it also has the disadvantage of costing a great deal more.

V. Jakob Nordentoft, Nykøbing. Mors: On Pyelography

The author has, since 1914, made steady use of pyelography in a number of selected cases without noticing any inconveniences to speak of from that method of examination. He now uses it in all cases of ill-defined renal disorders and of abdominal pains the cause of which cannot to a certainty be made out by any other means. He demonstrated on the screen various types of normal pyelograms; further, eleven hydronephroses, a couple of pyelograms showing cases of uritis and renal calculus, one nephrocystoma, one double kidney; and, finally, the cystogram of a congestive abscess, bismuth-injected, with passage into the vesica; and the urethrogram of a tuberculous stricture of the urethra.

Discussion:

1. S. JUNGHAGEN, Lund, showed roentgenograms of 15 cases of renal tumors diagnosticated by means of pyelography, and pointed out the roentgen changes that characterise cases of this kind.

2. P. FLEMMING-MØLLER, Copenhagen, cautions against the use of aqueous solutions, owing to the risk of necrosing the mucous membrane of the bladder. He has seen a case of that kind reported, and has himself been out for a case in which a 20 per cent. sodium chloride solution caused complete necrosis of the mucosa of the bladder. It is true that, in this last case, the error had been committed of not emptying the bladder after the pyelogram had been made; but, even so, the deleterious effect of the solution should be a warning to be careful of their use. The speaker himself has entirely discarded them, and now uses only iodides and umbrenal.

3. G. FORSSELL, Stockholm: I wish to call attention, in this connection, to an uncommonly practical pyelography table which has been constructed by Dr. ERIK LYSHOLM and is manufactured by the firm of GEORG SCHÖNANDER. It is combined with a flat Bucky-Potter diaphragm, is adjustable to various heights and angles, and enables one to photograph conveniently even with the patient in a standing or half reclining position. The roentgen tube can be shifted along on an arch above the table.

VI. Paul Jacoby, Copenhagen: Arteriosclerosis of the Aorta Abdominalis

The author demonstrates 7 cases of the said disorder and believes that its roentgenological diagnosis is of interest on the following grounds:

1) In milder cases, its establishment is important as regards the differential diagnosis, because there is a possibility of confusion with renal and urethral calculus.

2) In pronounced cases, it will aid materially in throwing light on any abdominal symptoms concerning the origin of which there may be doubt.

The demonstration of an arteriosclerosis of the aorta abdominalis can hardly be a matter of such rare occurrence as the great paucity of literature on the subject would lead one to suppose. In the frontal picture, the existence of the disorder reveals itself by striped shadows to the left of the columna; in the side view, generally by two calcareous shadows running parallel in front of the columna and meeting at a point level with the 4th lumbar vertebra.

It is possible to observe calcareous shadows in the side view picture, even in very slight cases; as proved by one case, in which the fact was proved by autopsy. In severe cases, dilatations of the aorta can be seen and measured.

Discussion:

1. Å. Åkerlund, Stockholm: When Dr. Jacoby says that he has observed only seven cases, all told, of calcification in the aorta abdominalis, I believe it must be due to the fact that he seems to use only straight side views — besides the straight ventrodorsad ones, in which it is well known that the calcification easily remains hidden to a most astonishingly complete degree. I am sure that if Dr. Jacoby will only try a slightly oblique projection he will find these calcifications of the aorta to be a matter of exceedingly common occurrence in persons of advanced age. The patient need only be placed in a slightly rotated position toward the left in order to get the best possible conditions for bringing out the shadows in question. In my material, at least, they are of quite usual occurrence in elderly persons. I remember, for instance, that in two of those three aneurismal kidney cases of mine, to which Dr. Jacoby just referred, there were calcifications of the aorta abdominalis; a fact which was both mentioned in the observation records and plainly to be seen in the reproductions of the pictures.

2. Dr. Jacoby: I thank Dr. Åkerlund for his friendly observations and shall be glad to try the little trick he indicates, of slightly rotating the patient. Still, all the same, I believe that an examination in straight lateral position, too, makes it possible to demonstrate even slight calcareous processes; as seems to be so nicely proved by the case I just mentioned, where the post mortem substantiated the fact.

VII. Elis Berven, Stockholm: Radiological Treatment of Malign Tumors in the Cavity of the Mouth[1]

Discussion:

1. S. A. Heyerdahl, Oslo: The good results obtained at the Radiumhemmet in the treatment of malign tumors of the oral cavity seem to be due beyond everything else to three improvements in the matter of technique. In the first place, an assiduous collaboration between the surgeon and the radiologist, in such a manner that each operation has been followed by an energetic radiological treatment; secondly, the use of electrocoagulation in all the cases that lend themselves to that treatment, especially cases of buccal cancer; and in the third place, the so-called »distant» radium treatment, by which the time of exposure is extended over several days, and the full, combined dose is made very large. This last-named method, especially, has given excellent results in the case of such cancerous tumors as do not generally react favorably to the application of filtered radium directly on the tumor — for instance, cases of the spinocellular type. As regards sarcomata of the oral cavity, I agree with Dr. Berven that they should by preference be treated radiologically, without any preceding operation.

2. Edvard Collin, Copenhagen: I wish to thank Dr. Berven for the instructive review he has just given us of a subject presenting so many difficulties to us all. What observations we have made at the Radium Institute at Copenhagen are yet too recent to permit of any really valuable judgment being formed on the basis of them, I will only refer to a communication I made last fall — at the congress of the Otolaryngological Society, at Aarhus — in which I stated that of 52 cases of cancer of the mouth (c. buccæ and c. gingivæ) 5 were still living three years after the treatment. Our technique is essentially the same as the one used at the Radiumhemmet. There are only two points concerning which I might make a special remark. One is that we have seen good results from the use of puncture with »naked tubes». Those results are too recent, yet, to allow of any definite judgment being formed as regards their ultimate value; but they are nevertheless an absolute encouragement to continue along that line. The second is that in treating the regionary glands we have, for the two last years, abandoned the use of hard filtered rays, and have gone over to use a quality of rays filtered through 3 mm. of aluminium, of which — both as prophylactic treatment and in the case of palpable glands — we give a strong erythema- (and epilatory) dose. This has resulted in a marked alteration of the metastatic picture; for not only have we, since adopting this new method, not seen a single case of metastasis occur, but we have noticed an unusually favorable effect on the existing glands, which have become reduced in size and have not grown again since; — effects which we have not observed from any other treatment of them.

3. Lars Edling, Lund: Results obtained at the Radium Dep't of the University Clinics at Lund with radiological treatment of malign tumors in the cavity of the mouth.

[1] Published in extenso in this no. of the *Acta Radiologica*.

Cancer of the Tongue

Operable 8

2 (3?) are alive and free from symptoms after 3 and 4 years, respectively. The third one emigrated to U. S. A. after having been free from symptoms for 3 years at the time of his departure.

6 (5?) have died: 2 after having been free from symptoms for 3 years or more; 1 from an accident, after 18 months, during which time he had been well and free from symptoms; 1 from severe, untreated recurrence after an absence of symptoms for 6 months; 1 after a couple of weeks, from heart disease.

Inoperable 11

1 without glands, alive. Remained free from symptoms for 3 years and 3 months; then local recurrence, which was treated by radium. No symptoms since, for more than one year.

10 with smaller or larger glands. All have died: 2 remained free from symptoms for 10 and 2 months, respectively; 8 were only temporarily improved, and died in from 2 to 9 months' time.

Operated on; recurrences 4

3 local recurrence without glands. Free from symptoms for a couple of months — 1 year — 20 months, respectively; subsequently died in from 3 to 8 months' time.

1 local recurrence + glands. Only temporary improvement; died after $4^1/_2$ months.

Operated on, prophylactic treatment 1

1 without glands. Freedom from symptoms for 20 months; then local recurrence, treated with radium. No symptoms for 4 months, then fresh local recurrence, this time treated by coagulation. Freedom from symptoms for 2 years and three months; then renewed local recurrence and renewed coagulation treatment. Again free from symptoms, this time for 6 months, after which a fourth recurrence set in, now + glands. Treatment by roentgen and radium. Died 9 months later, having lived for altogether $5^1/_2$ years after the operation.

Total cases 24

Cancer of the Sublingual Region

Inoperable 1

1 free from symptoms for 6 months. Died after 8 months, from influenza + pneumonia.

Operated on 2

2 in one of which there was local recurrence, afterwards freedom from symptoms for 1 year, then death from a heart disease. In the other: local recurrence + glands; temporary improvement; died 6 months after, from an old disorder of the kidneys.

Total cases 3

Cancer of the Inferior Gum and Lower Jaw

Operable 2

2 cases, both alive; have been free from symptoms for 4 and 3 years, respectively; in one of them there is now a local recurrence.

Inoperable 21

6 without glands. Three of these are alive, free from symptoms after 5, 3 and 1 years, respectively; but in one of them there is now a local recurrence. — Three are dead. Were free from symptoms for 4 years, 2 years and 18 months, respectively; then died after periods ranging from a couple of months to one year.

15 with larger or smaller glands. 2 are alive, free from symptoms after 6 and 3 years respectively; 13 have died: one, after 3 years' freedom from symptoms, had a recurrence and died a few months later; the twelve others were only temporarily improved and died after periods ranging from a few months to a year.

Operated on; recurrences, all with glands 6

5, at least, are dead. Of these, 1 was free from symptoms for 2 years; 3 only for a few months; all died in another few months' time. A couple of them did not carry the treatment through. One was healed 3 months after the treatment; but has not been traced since, owing to incomplete address.

Operated on, prophylactic treatment . . . . . none

Total cases 29

Cancer of the Cheeks

Operable 4

4, all alive. Free from symptoms after $3^1/_2$ years, 2 years, 2 years, and 1 year, respectively. In two of them, there has recently been a local recurrence, for which they are under treatment at present.

Inoperable 10

1, without glands, was free from symptoms only for a few months; then recurrence + glands, followed by death a few months after.

9 with glands, all dead. One remained free from symptoms for $2^1/_2$ year, another for a couple of months; seven were only temporarily improved and died from 2 to 6 months after.

Operated on, recurrences 4

2 without glands. Of these, one is alive and has been free from symptoms for 3 years; the other has died, after freedom from symptoms for 4 years, until time of death.

2 with glands, both died (only temporarily improved) after a few months.

Operated on, prophylactic treatment 1

1 case (only a single series of roentgen); recurrence 1 month later; roentgen-radium treatment; free from symptoms for 2—3 months; fresh recurrence, this time + glands; died 4 months after.

Total cases 19

Cancer of the Tonsils

Number of cases 5

2 without glands. One of them still alive and free from symptoms after $3^1/_2$ years; the other, temporarily improved, died 1 year after.

3 with glands; all have died. Two of them remained free from symptoms for 18 months and 1 year, respectively; and then died in the course of a few months. The third one, only temporarily improved, died within a couple of months.

Sarcoma of the Tonsils

Number of cases 10

2 without glands. Both freedom from symptoms for 1 year, followed by metastasis either in the glands or back of the peritoneum, and died inside of a few months.

6 with glands. Of these, 4 are alive and have been free from symptoms for from 4 to 6 years (in one of them there is now recurrence, in the glands); the 2 others have died — after freedom from symptoms for 1 year and 18 months, respectively — one from struma, the other from recurrence and metastases.

2 operated on, recurrence: one without glands, free from symptoms for 1 year, then recurrence + metastases and death; the other, with glands, free from symptoms for 3 months, then metastasis back of the peritoneum and died two months after.

Epulis

Number of cases 7

4 cases were on the upper gum, 3 on the lower. In 6 of the cases there was operation, 5 received professional radium treatment, 1 came in with a recurrence, 1 was not operated on. All — except one who could not be traced, owing to insufficient address — are known to be alive, free from symptoms; one (not operated on) after 9 years, three after 5, one after $4^1/_2$, and one after 2 years.

VIII. Per Amundsen, Oslo: Roentgen-Radium Treatment of Cancer Mammæ, Especially of Recurrences Following Operation

From 1912 to 1923, there were treated at the Radiological Clinic of the Rikshospital altogether 140 cases of cancer mammæ. Of those, 122 have been after-examined. 92 were recurrences following operation, 18 had come to get postoperative irradiation, 12 had not been operated on. The treatment has been partly *either* radium *or* roentgen, partly a combination of the two. The result is as follows:

Of the 92 recurrence cases, 10 lived for from 3 to 5 years after the treatment was begun; 4 are still living, of whom three are free from symp-

toms, while in the fourth case there are still epithelial nodules and ulcers 4 years after the treatment was commenced.

Of the 18 that were irradiated subsequent to operation, 10 (= 55.6 per cent.) remained free from recurrences for 3 years; 8 (= 44.4 per cent.) free from recurrences for 5 years. At the present moment, 7 are alive, free from symptoms.

Of the 12 that had not been subject to operation, 1 is still alive now, $3^1/_2$ years after the treatment was begun.

Recurrences should be treated by irradiation with strong doses: the roentgen dose 80 to 90 per cent. of 1 HED, repeated several times at intervals of from 6 to 8 weeks.

Postoperative treatment seems to lengthen the life of the patient. There, the roentgen dose should not be of more than 50 per cent. of 1 HED, repeated 3 or 4 times at intervals of 6 weeks.

There has not been observed any case in which the irradiation treatment has hastened the recurrence of the symptoms.

IX. Edvard Collin, Copenhagen: Radium Treatment of Cancer of the Eyelids, with Special Reference to the Results Obtained at the Radium Institute at Copenhagen [1]

My material comprises 40 cases of epitheliomata of the superior or inferior eyelid, including the external and internal canthus, often involving the conjunctiva, and takes in both the slight and the severer cases. A great many of them are recurrences following roentgen treatment or operation — which, as a rule, makes the radium treatment more difficult. The patients have been made to report themselves for control and, in as many cases as possible, have been examined by an oculist. This has, during the last years, been a firmly established rule. The diagnosis has in most cases been verified by microscopy; in a few instances the excision for test purposes has been omitted from considerations looking to a possible influence on the result of the treatment. The diagnosis is absolute in all the cases.

The material comprises 21 males and 19 females, in ages ranging from 40 to 78 years. In several instances, the affection was from 6 to 10 years old, and had in such cases become malign rather soon. In 22 cases, it was localised to the inferior palpebra; while, in the remaining 18, it was variously distributed to the external and the internal canthus and the superior palpebra. Of 19 cases, some other treatment had been attempted previously, but had been abandoned, and the cases sent for radium treatment. A great many of the cases were markedly severe, with destruction of more than half the eyelid. Especially was this the case with those — to the number of 15 — in which roentgen treatment had been attempted, mostly by non-specialists. But it is found here that the epitheliomata which are refractory to roentgen will yield to radium.

[1] To be published in extenso in a coming no. of the *Acta Radiologica*.

The results are divided into: »cured» and »not cured». The period of observation has been, on the average, 5 years — except in 4 cases, which have only been under observation for 9 months; but experience teaches that a correctly radium-treated carcinoma of the eyelid very seldom recurs when the cure has proved lasting for some months. Of the 40 cases treated, 33 (= 80 per cent.) were cured. The 7 cases in which a cure was not effected all belong to the very severe ones. To this must be added that 4 of them did not receive a sufficient amount of treatment, because, at the time, there was still some hesitancy concerning the proper technique; that 2 of the others presented severe roentgen changes, and the remaining one an extensive lupus with cicatricial changes resulting from that disorder and its phototherapeutic treatment. There is, consequently, a probability that it will be possible, in the course of time, to eliminate the causes responsible for the negative result registered in these seven cases.

Concerning the technique employed and the progressive phases of the treatment I must refer to the detailed communication which will be published in a near future. As to the injury which the radium treatment may do to the eye itself, I only wish to say that no lasting damage seems to be done, now that a screening of the eyeball, by 3 mm. of lead, has been introduced.

With the technique here employed, the final result of the radium treatment is undoubtedly a fine one. A smooth, elastic cicatrix is obtained, of natural form, and — thanks to the characteristic way in which the radium treatment acts; namely, by supplanting the diseased tissue with an ingrowth of richly vascular connective tissue and epithelium from the surrounding area — without any shrinking; in contrast to what is the case after roentgen treatment or operation, when there is a shrinking and indrawing of the tissues. Also as regards the cosmetic results, the radium treatment, thus, seems to be superior to the other methods.

Discussion:

Gösta Forssell, Stockholm: The time has now come when it is possible for us to overlook the results achieved by radiotherapy as applied to malignant tumors, and to compare them with the results obtained by other methods of treatment.

The hitherto most important method — and the one which is still dominating as regards malignant tumors of nearly every localisation — namely, the surgical one, is a purely mechanical therapy, based on the removal not only of the tumor itself, but of the surrounding tissue as well, to such an extent that, if possible, all tumoric tissue is radically extirpated. The radiological method, on the contrary, is based on a purely biological conception and handling of the pathological problem involved. Through the irradiation treatment, the attacking power of the neoplasm is reduced in such a manner that the natural defensive strength of the body is enabled to beat off the assault; and thus a natural process of healing is set on foot. According to some authors, the radiological treatment should even act directly stimulating on the local powers of resistance. The point to be aimed at in employing the radiological therapy is to find the dose that will be sufficiently deleterious to the tumor without entailing any undue reduction of the reactive power possessed by the surrounding tissues, and without hurting the organism as a whole. The radiological therapy may, thus, to a certain extent, be compared to a form of vaccination.

As a complement to the local radiological treatment it has been tried, by certain other measures, to strengthen the general resistency and reactive power of the body toward the tumor. It is well known that the internal secretion has undoubtedly a considerable bearing on the resistency against the tumors. We have thus, for instance, in certain cases of cancer mammæ, obtained most highly interesting results from castration by means of roentgen, as also from a combined thyroidin- and roentgen treatment.

The good results we have already had from the treatment of numerous papillomata by the means of an internal therapy with magnesium sulphate, either alone or combined with a relatively light radiological treatment, seem to point to the possibility of a successful combination of radio- and chemotherapy also in malignant tumors.

As regards the permanency of the healing, the number of years behind us already makes it possible to survey the results of the radiological treatment. A localised tumor that, by means of radiotherapy, has been brought to disappear in such a way that a clinical absence from symptoms has been obtained, does not recur, as a rule. To me, it even seems that the risk of recurrence is less when the healing has been brought about by radiological treatment, than is the case when it has been treated surgically. But, nevertheless, the radiological treatment of tumors is still in an early stage of its evolution. It entails great risks, and demands not only a thorough, special experience, but great technical resources as well.

The radiological treatment should therefore, in my opinion, be concentrated, in each country, to a small number of radiotherapeutic clinics where it will be possible to create institutions specially equipped for radiotherapy, and where the physicians attached to those institutions should devote themselves entirely to radiotherapy. At an institution of that kind there should be ward- and other accommodations sufficiently large to receive all the cases requiring hospitalisation, together with a policlinic where the cases could be thoroughly observed, and which would give scope for study and for amassing sufficient experience. A department for statistical records — with a staff large enough to cope with the time-consuming work of keeping track of the patients during and after ended treatment — is another feature absolutely necessary to the work, if the radiotherapy is to be properly developed. The technical equipment should be sufficient and of the highest order, and there should be every opportunity for following and keeping abreast of the rapid development in the field of radiotechnics. Two to three grams of radium is the smallest quantity that should be deemed sufficient for a radium hospital. Besides the departments already enumerated, there must be a department of radiophysics, with a thouroughly trained and capable physicist at its head, to control the physical conditions for the radium- and roentgen treatment, and to conduct scientific research work within the field indicated by the name itself of the department. Besides, there should be, in connection with at least one radiotherapeutic clinic in each country, a biological institution for experimental radiotherapeutic research work, headed by a practical biologist, to make studies in the special field of tumor diseases.

Of course, the direction of the whole radiotherapeutic institution should be in the hands of an experienced radiotherapeutist. So far, I must warn against shouldering the roentgen departments of the hospitals, or other clinics, with incompletely equipped annexes for radium treatment. They are bound to lead to disappointments and set-backs which may eventually be damaging to the whole

radium therapy, and may be more harmful than beneficial, both to the patients and the staff.

The strength of the Radiumhemmet lies in the very fact that, as an institution, it forms just such a one, complete unit, all the forces of which are working together in the most intimate contact toward the common goal and in the closest collaboration with surgeons, gynecologists, otologists and the rest of the medical specialists. It is only large radiological clinics of that kind that can compete with surgery in the treatment of malignant tumors; and it is only the large experience which such an institution — through practical work and opportunities for research alike — gives all the various members of its staff, that enables us to practice scientifically and further develop the radiotherapy as applied to malignant tumors.

As regards the respective advantages of radium and roentgen treatment, it seems that the former is superior to the latter in most cases of malignant tumors, especially for those of the oral cavity and the uterus. In my opinion, roentgen treatment will bear comparison with radium only in cases of smaller skin and lip tumors, and of certain sarcomata.

We must always bear in mind, however, that the radiological treatment in tumor cases is a purely local treatment, except in the cases where it is possible by means of the radiation to act on the endocrine itself. A radical healing can probably be obtained only in the case of tumors that are definitely circumscribed — which will generally be as much as to say either such as are operable, or circumscribed ones which, owing to their topography, are technically inoperable. Of extensive, diffuse, inoperable tumors — and of tumors that have alreedy metastasized in direction of the glands — it will probably only in very exceptional cases be possible to obtain a radical healing by radiotherapy alone. We may, in such cases, gain a temporary, shorter or longer, freedom from symptoms; or a bettering of the objective and subjective symptoms; but for the local radiological treatment of the inoperable tumors to give a better result, it will undoubtedly have to be combined with a general therapy of some form or other.

X. Dag B. Carlsten, Malmö: Some Practical Experiences with the Baastrup-Johnson Dosimeter[1]

During about a month, the author made a great many practical tests with the now perfected model of this apparatus. It was found easy to manipulate, solidly built, and gave deflections which, to judge from the comparative measurements, were thoroughly reliable. With a strong filter and hard radiation 1 HED — measured directly on the skin — equalled about 750 to 800 R. The author suggested certain easily practicable changes in the disposition of the instrument board, etc., for the purpose of facilitating the reading and make the measuring of the dose absolutely secure, and shows the advantages that would result if it were possible to alter the shape and size of the dosimeter-box for measurements on phantom and in cavities of the body. The model used made, on the whole, a thoroughly good and confidence-inspiring impression, which augured that this, the first self-integrating dosimeter, when it

[1] To appear in extenso in a coming no. of the *Acta Radiologica*.

had attained its definite form, would meet with the appreciation and success which it deserves.

Discussion:

1. Prof. H. M. HANSEN, Copenhagen: If I come forward, it is not because I have any observations to make in connection with the very interesting communication we have just heard from Dr. CARLSTEN, but because I believe it may be of interest, now that the roentgen ray dosimeter constructed by Mr. JOHNSON at the suggestion and with the collaboration of Dr. BAASTRUP has been put on the market and has been in regular, practical use for some time, briefly to see just precisely what physical features distinguish that apparatus from other devices of a similar kind that have appeared in recent years. If I am the one who feel called to do so, it is because I, too, have had occasion to work with the apparatus for some time, having undertaken the task of its preliminary adjustment. In one way it is, of course, a matter for congratulation that so many new devices for measuring the roentgen rays should be brought out, one after another, these days; for the very fact that there is evidently a market for them shows that a practical interest has been awakened in the question of exact dosage. But, on the other hand, their very number unfortunately proves that, after all, no absolutely and thoroughly satisfactory solution of the problem has been found, so far.

The Johnson-Baastrup Dosimeter belongs to the type of directly registering apparatus, as contrasted to the electrometric ones, with which the dosis is determined by measuring the time required for producing a certain, given deviation of the electrometer. There can be no doubt, of course, but that the directly registering apparatus are the ones which practical work demands. With the electrometric apparatus, the measuring is altogether too circumstantial for practical use, and to control the steadiness of performance of the roentgen equipment requires several measurings in the course of each single treatment. The Johnson-Baastrup apparatus, like the Siemens one, uses an amplification, by means of electron tubes, of the ionisation current produced by the roentgen rays; but, in contrast to the Siemens apparatus, it permits in a very simple way to *measure off* the dose at will, in such a manner that either the current to the roentgen tube is cut off, or some other signal given, when the full dose required by the operator has been reached. This same problem — of a signal indicating when a certain dose has been reached — has lately been solved, however, by two other apparatus as well; namely, by the »Hammer-dosimeter» and by STRAUSS's »Mekapion», both of which have a relay which measures off a certain exact dose, and a counting device which checks off how many times that dose has been given. In the Hammer-dosimeter, the relay is an electrostatic one; but of its more detailed construction it is impossible to say anything, as it is encased out of view. It seems to function all right; but one nevertheless feels somewhat uncertain as to its reliability and unchangeability in the long run, before it has been tested practically for a greater length of time. In STRAUSS's Mekapion, there is a very ingenious use of an electron tube in the relay; but alone the fact that the isolation of that tube is put to a very severe test, here, makes one feel rather unsafe as to the matter of its absolute unchangeability. On the whole, I believe that, as regards these relay apparatus, a considerably longer practical working experience is needed before we can pass any final judgement on them.

The Siemens and the Johnson-Baastrup apparatus have that in common

— as I have already said — that the feeble ionisation current is intensified by means of an electron tube; but the Siemens apparatus is dependent on the qualities of that tube to a far greater extent than the Johnson-Baastrup apparatus. The demands made on it in the matter of isolation are most exacting; and its so-called »characteristic» — the relation of the influencing grid-tension to the measured anode current — enters directly into the result of the measuring; and for that reason it is absolutely necessary that this characteristic should be very exactly known. As regards the isolation, the problem is solved very nicely by means of a special tube construction, the only drawback to which is that it is rather expensive. As regards the characteristic, a diagram of its exact curve accompanies every individual tube sent out; but those very small modifications which unavoidably will occur when the tube is being used — and which, of course, are of no importance except just in connection with very minute measurements — can only be detected by testing and determining the characteristic afresh; which will not be an altogether simple matter for a non-physicist. To my mind, there is no doubt but that, from a physical point of view, JOHNSON's solution is the finest, and one which is of interest quite beyond the special problem accounting for its achievement. In JOHNSON's apparatus, we are quite independent of the characters of the electron tube. Only such modifications as may eventually occur during the actual measuring will have any bearing on the result; and those we may with perfect conscience disregard — so much the more as, in the very rare cases where they *might* occur, the fact would be discovered afterwards, anyhow. The electron tube can at any time be exchanged for a fresh one of the same, or merely of similar type, without changing either the constants of the apparatus or the manner of its using. There have naturally been a great many difficulties to overcome in the task of making this apparatus perfect for practical use. Let me mention only the one of making the device — which is, of course, almost a detector — insensible to electrical influences from the high-tension supply to the roentgen tube; something which was, however, successfully accomplished at last, notably by sheathing the electron tube completely in an envelope of copper. The fundamental problem is the construction of the high resistance, through which the ionisation current passes in such a manner that — both in this and in the Siemens apparatus — the drop in the tension, in the resistance, is used to influence the grid of the electron tube. To make constant a resistance of so many millions of ohms is an extremely difficult problem, technically; but Siemens has evidently solved it, which shows that it *can* be solved. As to whether the resistances used by JOHNSON are absolutely constant, I dare not say anything positive, yet, after the short time I have had occasion to work with the apparatus — even if I have discovered no signs to the contrary, so far. At any rate, there always remains the same means to fall back on — and the one, in fact, which Siemens is constantly using, too — namely, to control the constancy of the resistances by means of radioactive preparations. I don't think we can get around the necessity for using a similar control here; but, even so, it does not imply any great amount of expense or bother, after all; while, on the whole, it furnishes rather a desirable guarantee of the apparatus being in proper and complete order. That it is necessary, while measuring with the apparatus, constantly to regulate a resistance in order to keep an indicator steady at the same point is not, to my mind, any more of an inconvenience than the fact that, with the Siemens apparatus,

one has to keep an eye on the point of the indicator all the time. As long as we don't have roentgen outfits that are *absolutely* constant in their functioning there must be either observation *or* registration; and the registering device which can be added to the Siemens apparatus means an added expense, and additional work of figuring out the doses later on: even though, of course, on the other hand, it means a valuable possibility of being able to preserve an authentic record concerning the treatment.

The details of the apparatus, as worked out by the inventors, I shall not speak of at all; the less so, because it has probably not yet on all points received its definite form. Nor do I need to discuss the ionisation chamber and its construction, seeing that all the apparatus which I have mentioned in principle allow the use of any desired type of such chamber. My purpose, with these few remarks, has only been to make it clear that, from the physicist's point of view as well, the Johnson-Baastrup Dosimeter presents a very fine solution of the roentgen dosimetric problem; so that when now, ere long, it shall have received its final shape, it may be cheerfully recommended to the interest of roentgen therapeutists.

XI. Eigil Rekling, Copenhagen: Two Different Ways in which the Light Bath Produces its Effect in Experimental Rickets in Rats

The author, employing a special method of experimentation, has exposed to ultra-violet irradiation a number of young rats that were being kept on a rickets-producing diet. Some of those animals had been shaved, others not; and the conditions of the experiment were such that it was made impossible for any of them to lick up or otherwise ingest *per os* their secreta, including those from their skin.

As in other experiments, previously reported, it was found that, in spite of the irradiation, the animals that had not been shaved continued rachitic, and their contents of acid-soluble serum were decidedly low. The *shaved* animals, on the contrary, under conditions of experimentation exactly similar, were cured, and the contents of inorganic phosphorus in their blood serum were high.

It has thus been proved that the effect produced by the »antirachitic» field of the spectrum — as regards experimental rickets in rats — can be due either to an »activation» of the lipoidal skin secretions that are being eaten by the animals, or to an action of the rays through the epidermis after the intervening barrier of the fur has been removed.

XII. Svend Lomholt, Copenhagen: Radium Emanation in Sheets of Wax, for Use in the Treatment of Skin Diseases

The author demonstrates a method — worked out in collaboration with Mr. I. C. Jacobsen, M. A. — to use radium emanation in a practical manner,

in skin cases in such a way as to obtain: 1) a uniform, medium soft, protracted irradiation, with utilisation of most of the Beta- and soft Gamma rays; 2) an exact limitation of the effect, to the affected area; 3) a minimum of time wasted for the patient.

Procedure for making: Wax is put into a melting pot, heated, and a suitable number of emanation tubes crushed into it. The mass is poured upon a plane sheet of brass, over which a piece of tinfoil or heavy paper has been pasted by means of vaseline. The wax is made to harden quickly, by passing over it cotton saturated with liquid air. The wax can then be removed together with the tinfoil or paper, forming a thin sheet of about 2 mm.'s thickness.

Measuring: After 3 hours. A loss of 30—40 per cent. of the emanation must be reckoned with. A strength of from 0.03 to 0.08 M. C. per square cm. will prove suitable to the purpose.

The radiation is chiefly a soft one. In a depth of 4 mm. of the skin nearly all of it will have been absorbed, only the hard Gamma radiation remaining. One millimeter will absorb about two thirds, two millimeters about three fourths, of the total radiation.

Manner of application: The wax plate is cut in pieces according to the shape of the patches to be treated, is fastened with adhesive plaster and simply left for 1—5 days according to the radioactivity of the plate used and to the effect desired, causing no loss of time to the patient.

Dosage: From 1.5 M. C. per cm.^{2} to 3.0 M. C. hours, in exceptional cases up to 5.0 M. C. The halving time of radium emanation being 5 days, the dose, in M. C. hours per cm.^{2}, can easily be calculated according to the time of application, by multiplying the figure found for the radioactivity by the following *constants:* 24 hours, *22;* 48 hours, *40;* 72 hours, *55;* 96 hours, *66;* 120 hours, *79;* 148 hours, 88.

Indications: 1) *Obstinate Psoriasis Patches.*
Dose: 1.5—2 M. C.
(0.04—0.05 M. C. in 48 hours)
2) *Neurodermatitis; Chronic Eczema*
(Dosage as above)
} Moderate erythema after 2—3 weeks.

3) *Multiple basal-cell Carcinomata*
(6 M. C. = 0.08—0.09 M. C. × 96—120 hours)
4) *Cheloids and hypertrophic scars*
(4—5 M. C. = 0.06—0.07 M. C. × 72—96 hours)
} Strong erythema after a few days: and sometimes bulla.

The therapeutical results in these affections are nearly always excellent; in cases of hypertrophic scars (cheloids) they seem to be superior to those obtained by any other treatment.

Risks: We have never observed any serious after-effects; only in a very few cases has there been a slight atrophy with teleangiectasia, and only after repeated irradiations. Three irradiations are probably the maximum that should be given within a short period.

XIII. Svend Lomholt, Copenhagen: New Models of Apparatus for Use in Local Finsen Treatment

Demonstration of

A. *Two Models of Concentration Tubes*

1. A 50 cm. tube with 3 planoconvex lenses, 8 cm. diameter. Toward the light — a carbon arc of 20 Amps, with the positive carbon in the continuation of the axis of the tube and with the negative carbon at a right angle to it — two lenses with a focus distance of 10 and 15 cm. respectively are placed. In the other end of the tube one with a focus distance of 12 cm.

2. A 90 cm. tube with four lenses, 8 cm diameter, for use in the classical Finsen installation, with four apparatus round one 50 Amps carbon arc. In the upper end, towards the arc, two lenses ($^1/_{12}$ and $^1/_{25}$), in the middle one ($^1/_{25}$) and in the inferior end one ($^1/_{12}$).

Both tubes are made of Jena glass to prevent the distilled water from absorbing metal oxides, as is the case with the original brass tubes, from which up to 13 milligrams of metal per liter can be absorbed in less than two days, causing a remarkable absorption of ultraviolet light.

The tubes are filled to their full extent with distilled water and are included in tubes of brass as to permit a cooling of the glass tube by a current of ordinary water passing through the thin space between the two tubes.

The lenses are all made of fused silica, which is perfectly thermoresistent and thus permits to approach the lenses close to the arc. Hereby a much wider sector of the light can be utilized, so as to increase the power of the light column to more than the double. This strong light is tolerably well supported by the patients, because the long water filters employed considerably increase the absorption of the heating infra-red rays (Aschkinass). The new position of the positive carbon in the smaller construction requires no continual control of the arc during the treatment.

B. *A Compressor of Fused Silica, with Two Chambers,*

making it possible to keep the temperature close to the skin as low as at 2—4° Celsius; dewing of the front surface of the apparatus being prevented by a current of tepid water passing through the upper chamber or by filling it with a thin solution of sulphate of cobalt, which absorbs some of the green and blue rays, but is absolutely transparent to the ultra-violet rays.

C. *Some Absorption Curves for Aqueous Solution of Sulphate of Cobalt, and for Ammoniated Solution of Sulphate of Copper with Strong Excess of Ammonium* (*after Prof.* Winther.)

XIV. Mr. Poul Lundbeck, Engineer, Copenhagen: Some Novelties in the Field of Radiotechnics

With the aid of projections on the screen the speaker demonstrated: 1) a device for preventing casualties from accidental contact with high tension wires, or with roentgen tubes while the high tension current is turned on. The chief features of the device are two condensators, which are introduced on the high tension circuit, and an easily exchanged safety-plug of the perforation type. If any part of the high tension circuit is come into contact with, a thin layer of insulating material in the safety plug is immediately perforated, and the tension of the transformator breaks down in less than 1/300 of a second; 2) a new apparatus for diagnostic purposes, to be operated with very high milliamperages (1000 mA. and more). It is built on the same principle as the direct-voltage, so-called »Stabilivolt» apparatus, but with details, electrically, of entirely different dimensions. In spite of its great power of performance it is of moderate size, and its consumption of current minimal; 3) a stereo-radiographic apparatus, the chief feature of which is the use of two special roentgen tubes, with which alternating exposures are made, with cassette and roll-film. The position of the cassette in relation to the patient is a fixed one.

XV. Gösta Jansson, Helsingfors: The Effect of the Roentgen Rays on the Cytoplasm[1]

As a result of his investigations the author has come to the following conclusions:

1) that it has been possible to follow in the ultramicroscope the course of the roentgen reaction in the cytoplasm of the living neutrophile leucocytes and myelocytes, from the beginning of that reaction until it ended in the death of the cell.

2) that both functional disturbances and morphologic changes became apparent in the cytoplasm even before the nucleus showed any signs of alteration.

3) that the process of the roentgen reaction in the cytoplasm follows a fundamentally different course in the unripe cell from what is the case in the fully ripe one. The plasma of the myelocyte coagulates, while that of the neutrophile leucocyte colliquates.

4) that the cytoplasm of the unripe cell is far more radiosensitive than that of the fully developed one.

5) that everything points to the conclusion that the radiosensibility is determined by the character of the plasmatic colloids, which is not the same in the fully developed cell as in the unripe one.

[1] To be published in extenso in a coming no. of the *Acta Radiologica.*

6) that the ascertained qualitative differences in the primary effect of the roentgen rays on the cytoplasm do not tend to support the »point-heat» theory of DESSAUER.

7) that a uniform primary effect in DESSAUER's sense probably does not exist; but that the nature of the dispersed phase in the plasma and the peripheral layer of the cell are determining for the primary effect of the roentgen rays in the latter.

8) that future cytological studies in the field of radiobiology, in judging the results of investigations made, must take distinctly into account whether the cytoplasm in question has been an unripe or a fully developed one.

XVI. Paul Jacoby, Copenhagen: On the Absorption of Roentgen Rays and the Biological Effects Produced by Rays of Different Qualities

The paper read by the author formed the sequel to an article previously published by him in the Acta Radiologica (vol. V, 1926). It dealt partly with measurements of roentgen-ray absorption in platino-cyanide of barium and wolframate of calcium, partly with observations of biological effects from various qualities of rays, as noted in experiments on animals.

The technique employed for determining the amount of absorption in the substances mentioned consisted in measuring the intensity of the roentgen radiation from a stabilivolt apparatus by means of a Siemens' dosimeter, first directly and afterwards with the ionisation chamber enclosed in a tube of some material embodying the substance that was the object of the test. The difference between the two measurements expresses the amount of absorption in that substance under the given conditions of experimentation. All the measurements were made on paraffin phantom, partly at surface, partly at a depth of 10 cm.

The speaker briefly recapitulated his earlier paper, and quoted measurements which showed to what degree the intensity of the primary radiation was increased 1) by the secondary radiation (about 35 per cent.), 2) by the size of the field, and 3) by increase of the tension. It was shown that a tension-increase of from 100 to 120 kilovolts does not increase the depth-percentage materially.

I. The first purpose of the present paper was to show that with the radiations generally employed in therapeutical work the selective absorption in barium or platinum is not, in practice, so serious a source of error as some operators believe, in reference to the use of the Sabouraud pastille with varying qualities of rays. Curves of the absorption taking place in the Sabouraud paper with increased filtration show that absorption to take place at an evenly deceasing rate; and the absorption curves for barium sulphate and calcium wolframate (intensifying screens), as well as for sulphide of zinc (the Astral fluoroscopic screen) follow lines exactly parallel with the first-named. As, with sulphide of zinc, the characteristic absorption takes place at wave-lengths far outside the radiations used in therapeutical work, this parallelism between the absorption-curves for platino-cyanide of barium and sulphide of zinc shows that, as far as therapeutical radiation is concerned,

the selective absorption plays no practical rôle as regards the Sabouraud pastille either.

II. Just as it is possible, with the technique indicated above, to investigate the quality of the different rays by means of calcium-wolframate tubes, so it is, on the other hand, possible to measure also the absorbation that takes place in the various intensifying screens. The author showed how much and how variously those different screens absorbed, and how inadvisable it is to employ too soft a radiation for photographing, when intensifying screens are used.

III. After trying to prove theoretically that the measuring of the primary radiation alone, as a basis for practical dosing — in the manner proposed by HOLTHUSEN and others — is not sufficient, the author demonstrated the results of measuring the absorption in platino-cyanide of barium — first of the primary radiation alone, then of the full radiation as measured both at the surface of the paraffin phantom and in its depth, and finally of the secondary radiation alone. It was shown how, with strongly filtered radiation, the primary radiation is much harder than the surface-radiation, and how the latter again is harder than the deep radiation, while the secondary radiation is found to be very soft, even. In other words, these measurements show that *the Compton effect — or rather, a multiple Compton effect — has an immense influence on the quality of the therapeutic radiation employed*, and that half-value measurements of the primary radiation will serve but very poorly to determine the exact character of the roentgen radiation used. Thus, for instance, of the primary radiation only 4 per cent. are absorbed in platino-cyanide of barium; while of the purely secondary radiations as much as 30 per cent. are absorbed by an irradiation through 0.5 mm. Cu + 1 mm. Al. In the case of unfiltered soft radiation the Compton effect does not play any rôle; rather does the radiation in the depth become harder than at the surface, because the paraffin acts as a filter. When measurements are made with radiations of increasing hardness, up to 3.5 mm. Cu., the Compton effect makes itself felt more and more strongly, in such a manner that the proportionality between the amount of absorption at the surface and in the depth of the paraffin phantom, respectively, becomes increasingly favorable. The author suggests the introduction of a new term: »depth-absorption percentage», meaning thereby the number of hundreth-parts of a radiation that can be absorbed in the depth when the surface radiation is reckoned as 100, and to use this measure instead of the old »depth-percentage». By sufficiently strong filtering it is possible to obtain a depth-absorption percentage of nearly 100; that is, a radiation which acts just as strongly at a depth of 10 cm. as at the surface. The results of these measurements lead to the conclusion that it would be of the utmost value if apparatus and tubes could be constructed that would allow the use of very strong filtering without any too great resulting loss of intensity. The author thinks that the undoubtedly stronger therapeutical effect of the radium rays may possibly be explained on the basis of theories similar to the ones here set forth.

IV. The animal-experiments were made for the following purposes: 1) to find a more or less constant biological measure for the effect of the roentgen rays. Choosing as such the »mouse-killing dose» it was found that mice almost invariably die in from 4 to 10 days' time after being irradiated on paraffin phantom with a dose of 0.5 HED, or more, through 0.5 mm. Cu.; 2) to investigate whether harder rays were less effective than soft ones as a

lethal dose, in the same way as clinical experience seems to prove it in regard to the erythema dose. The experiments decidedly failed to show any such difference. When the intensity was the same for the different qualities of radiation — thus permitting to leave aside the factor of time — the rays of different quality acted similarly; perhaps would even the effect produced by the hard rays be just slightly stronger.

V. Finally, the author gave an account of some experiments which seemed to show that the darkening of the Sabouraud pastille, as a photochemical reaction — and, thus, in contrast to the measuring apparatus based on the principle of ionisation — is dependent on the factor of time in the same manner as the various biological reactions.

Discussion:

EDV. COLLIN, Copenhagen, wishes to thank Dr. JACOBY for his large and extremely valuable contribution, which it has been difficult, however, to follow in its details. He only wishes to remark that at WINTZ' clinic in Erlangen, for instance, considerable attention has been given to the problem arising from this fact that measurement of the primary radiation does not give an exact expression for the dose actually received by the body, because there has to be added to it the amount of secondary radiation by which the primary radiation has been increased, after calculating the depth-percentage. There has, thus, on the basis of experiments, been established a curve which indicates — though roughly — how many per cent., considering the quality of rays employed and the size of the field, must be added to the direct depth-dose of the primary radiation.

XVII. Carl Sonne, Copenhagen: The Dependence of Photo-Biological Reactions on the Wave-Length of the Light

In a very fine work published in 1922, the physicists HAUSER and VALDE showed that the power of the light to produce erythema resides chiefly in the ultra-violet rays with a wave-length of about 300 $\mu\mu$. From this it has come to be generally accepted that it is there, also, that lies the therapeutic effectiveness of the light; and inasmuch as that therapeutic effectiveness is held to be largely connected with the photo-biological reactions produced by the ultra-violet rays, it soon, at the same time, came to be taken for granted that all therapeutic and photo-biological reactions must have their maximum in just that particular part of the spectrum — the range from about 310 to 290 $\mu\mu$. Now, it has recently been shown, however, by REKLING and SONNE, that this is at least not true as regards the therapeutic effect in experimental rickets, on rats; and SONNE has shown that the hemolysing effect of the light first increases evenly through the ultra-violet spectrum and then, at 240 $\mu\mu$, suddenly rises very abruptly and seems to find its maximum there for the time being; while the paramecicidal curve has its maximum at still another point, namely, at 280 $\mu\mu$. Those experiments have now been extended to comprise various other photo-reactions, namely, the albumin-coagulating, the

methemoglobin-producing and the bactericidal effects of the light. All these three reactions have been studied by means of an agar-method which permits increasing irradiation with each of the separate lines in the spectrum from a mercury-quartz lamp, and an exact reading of the precise instant at which the reaction begins to set in; while, at the same time, the energy in the lines was measured by means of a linear thermograph. As a result it was found that all the three reactions just named had their maximum at about 260 $\mu\mu$, and — in a general way — that these curves run more or less alike, which must probably be taken as an expression of the light's denaturing effect on proteïn substances. The hemolysis-curve, with its maximum much farther out toward the end of the spectrum, and with its altogether different run, may possibly be an expression of the light's effect on the lipoids — that is, in this case, the membranes of the blood corpuscles. As regards the other curves — the erythema-curve and the paramecicidal curve — it may possibly be a question partly of proteïn-, partly of lipoid effect, combined with the special conditions of the light's penetration into the skin and the paramecia. The idea that the photo-biological reactions should, in a general way, follow the curve of the erythema, may as well be dismissed.

Discussion:

S. A. HEYERDAHL, Oslo: As an old pupil of the Finsen Institute at Copenhagen I continue to follow with great interest anything new that comes from that old and famous institution. I would be permitted to congratulate Dr. SONNE on the interesting paper to which he has just given us the pleasure of listening. His investigations will undoubtedly prove very valuable for our understanding of how the various kinds of light act on different diseases.

CARL SONNE: The outside limit of the sun's ultra-violet spectrum varies very little. Even on the highest mountain tops it does not extend very much beyond 290 $\mu\mu$ wave-length. In the lowlands, of course, it hardly extends that far.

XVIII. Poul Schultzer, Copenhagen: The Influence of Light toward an Increased Metabolic Retention of Phosphorus and Calcium

After the treatment with ultra-violet light had been introduced in the therapy of rickets, there naturally arose an interest in the question as to what influence light might have on the metabolism as regards the retention of phosphorus and calcium.

American investigators, for instance, have made studies of that question on children with rickets, and have found that the light caused an increased retention of the two substances, due to increased resorption. The smallness of their material made their conclusions liable to some doubt, however, as it was not absolutely excluded that the results arrived at might be more or less due to individual fluctuations, or to some spontaneous improvement in the cases observed.

It must, therefore, be regarded as a considerable step in advance that the study of experimental rickets has been added to the means by which it is endeavoured to throw the fullest possible light on that disease; and here the most important studies, by far, are those that have been made of rickets in rats. According to McCollum it was possible to produce in young rats a disorder resembling rickets, by putting them on a diet containing phosphorus and calcium in reciprocally unfavorable proportions, and more or less lacking in the so-called »anti-rachitic factor». It was very soon found that the disorder could be prevented — or, if already started, could be cured — by the administration of codliver oil or by irradiation with ultra-violet light.

The investigations of which I am going to speak were carried out at the laboratory of the Finsen Institute during the years 1922 to 1925. The task which I set myself was to study the metabolic effects of the light, in regard to phosphorus and calcium metabolism, on a considerable number of young rats that were put on different kinds of special diet. Of the four dietary types thus experimented with, one was extremely poor in phosphorus, and resulted in the animals losing weight, but did not produce any macroscopical osteous changes. The two next ones were, first, McCollum's rickets-producing diet no. 3143, which is poor in phosphorus; secondly, a modification of the same, lacking in calcium instead of in phosphorus. Both of these produced marked osteous changes in the animals. The fourth type was likewise a modification of no. 3143, but had no rickets-producing effect, as it was lacking neither in phosphorus nor in calcium.

It resulted from those investigations that the ultra-violet light-bath had a marked metabolic effect, as regards the retention of phosphorus and calcium, on the rats that were fed on a diet lacking in one or the other of those two substances. On either of those diets the retention both of phosphorus an calcium was increased, and this increased retention was brought about through increased resorption. On the other hand, the light-bath had no metabolic effect, as regards either phosphorus or calcium, on the animals that got the diet in which neither of those two substances were lacking.

The weighing of these results leads to several interesting questions: among others, whether the ultra-violet light-bath influences the metabolism, as regards phosphorus and calcium, through the cure of an existing rachitic condition. That is not the case, however. In the first group of experiments there were no signs of rickets in the animals; yet the light-bath increased the retention of phosphorus. The result of this experiment fits perfectly with the observations made by the American investigators, who have studied the metabolic changes in regard to calcium on full-grown animals (goats) in whom, during the period of lactation, the calcium-balance was negative. From this it would seem that the effect of the light is a more general one, influencing favorably not only the rachitic organism, but also organisms in which there is a deficiency of calcium due to other causes. On the other hand, it would seem, from my fourth experiment, that the light has not any effect on the calcium-retention in an organism in which the conditions of retention are in themselves favorable.

XIX. H. C. A. Lassen, Copenhagen: Light-Sensitization in Ultra-Violet

With paramecia as the material investigated on, the author has shown that in the ultra-violet spectrum of the mercury quartz light there are two relative maxima of biological effectiveness; one — as already shown by SONNE — at 280 $\mu\mu$, and another, not previously demonstrated, at the extreme end of the ultra-violet field — at 227 to 220 $\mu\mu$.

He has further shown that hematoporphyrin will render infusoria sensitive to the innermost ultra-violet rays, and that a similar sensitization is produced — though in a much lesser degree — toward the outermost rays of the same spectral range.

It is found that the fields of sensitization thus ascertained correspond to the ones in which the hematoporphyrin shows ultra-violet absorption.

XX. Carl Krebs, Aarhus: Experimental Studies Concerning the Effects of Radium- and Roentgen Rays in the Treatment of Cancer Uteri[1]

Discussion:

G. FORSSELL, Stockholm: I wish to thank Dr KREBS for his very interesting communication. The results of his experimental studies tally in several respects with our clinical experience; and besides, they furnish us with some impulses that may prove helpful in aiding us to develop our technique. Dr KREBS observed only a slight direct effect on those tumors that were located 2 or 6 cm. away from the source of radiation. At the latter distance there was no reduction in the vitality of the tumors; nor at the shorter distance — at 2 cm. — was there any lethal effect. To me, those observations seem to make it probable that when we nevertheless in practice obtain a permanent cure in a great many cases of cancer of the collum uteri in which the tumor tissue undoubtedly extends not only for two, but often as much as six cm. away from the source of radiation, then it must be due to the body's own resistance, which — when the vitality of the tumor has been lowered — under favorable conditions may be sufficiently strong to suppress and overcome it completely.

Dr. KREBS' observation that radium is superior to roentgen ray in the treatment of cancer uteri is, of course, precisely what clinical experience has confirmed. I went over, myself, to use radium exclusively, for cancer of the uterus, as early as in 1913; and I believe that the relatively good results we have been able to record at the Radiumhemmet may, in no small measure. be ascribed to that fact. It is only in cases of glandular metastases situated away out in the parametria that we try with roentgen ray alongside of the radium treatment.

It would not be justified, however, to seek the explanation of this difference in curative effect first or chiefly in any inherent differences between the character of the radium- and roentgen radiation as such. Rather is the explanation to be found in the different manner of application. In treating

[1] To be published in extenso in a coming no. of the *Acta Radiologica*.

cancer of the uterus it is enormously difficult to bring an effective dose to bear on the tumor, through the skin, without causing a damage to the surrounding tissues that will prevent the tumor from healing. With radium, we get the attack directed centrally against the tumor itself and can, thus, avoid damaging the peritumoral tissues. — Finally, I should like to ask Dr. KREBS whether, in the course of his experiments, he has made any observations concerning the possible influence of distributing the radium dose over a shorter or longer time of treatment, or, eventually, the use of broken doses.

Dr. KREBS: The question of the rôle which the time-factor plays in the irradiatiation of tumors is, precisely, one which has been the subject of our study at Aarhus, these last months. It requires, however, so large a material before the solution of the problem can be considered as in any way certain, that I would rather not, at the present stage of our research, pronounce myself on the subject at all.

XXI. Hugo Laurell, Uppsala: Roentgenologically Demonstrable Changes in the Subcutis, Accompanying Deep-Seated Inflammatory Processes[1]

The author describes a case of appendicular abscess, clinically difficult of interpretation, where roentgen examination gave valuable information. Besides the ordinary, previously known roentgen appearance of a retroperitoneal inflammation one could see in the right side a definite subcutaneous net-work, consisting of dilated vessels. These vessels were so deeply situated in the well developed subcutaneous fatty tissue as to escape detection on external examination. They remained nearly unchanged for several weeks. In the author's opinion this vascular net-work is not only a sign of active hyperemia but also, and mainly, an expression of an inhibited venous outflow from the abdominal wall; apparently this was mainly caused by thrombosis of the deeper veins in the abdominal wall and its neighbourhood, where these veins pass behind the colon in the retroperitoneal tissue and where they might easily have been damaged through involvement in a paracaecal inflammation.

The author draws attention to the fact that similar vascular net-works, only visible under the roentgen rays, can sometimes be seen in children with acute osteomyelitis of the extremities, where the subcutaneous fatty tissue is well developed and so hindering the vessels from being seen on external examination. These roentgenological signs, as well as a diffuse swelling of the soft parts and disappearance of the normally visible intramuscular septa in the diseased area, can be seen roentgenologically in a stage when no skeletal changes are as yet demonstrable.

XXII. H. J. Panner, Copenhagen: A Case of Vertebra plana (Calvé)[2]

The author reports what he believes to be a case of »vertebra plana» — similar to the disorder of which two cases have been described by CALVÉ, and

[1] Published in the *Acta Radiologica* vol. VIII, pp 289 ff.
[2] Published in extenso in this no. of the *Acta Radiologica*.

two others, more recently, by HARRENSTEIN. While those four cases were of children less than seven years old, however, the subject of the author's case was thirteen years old at the time when the disorder first declared itself. He was examined again nine years after. At times, the disorder has been the cause of no little discomfort to the patient, has made him more or less of an invalid, and — after an almost complete absence of symptoms for about four years — has recently necessitated his wearing a bandage. The disorder has resulted in a rather pronounced kyphosis and scoliosis. Roentgen examination shows those features quite plainly, and also shows that the corpus of the diseased vertebra (the ninth thoracic) still, after nine years, retains the same small vertical diameter as noted at the first examination; while it also continues to be separated from its normal, nearest neighbour on each side by perfectly intact intervertebral spaces. The author points out how extremely difficult it is to be positively sure *when* there is complete healing in a case of this kind.

Discussion:

1. P. FLEMMING MØLLER, Copenhagen, does not think that Dr. PANNER is right when he says that the disease still exists. The intervertebral pads have the same width on either side of the vertebra, and the same width as when first observed, years ago. This rather seems to indicate that the affection has healed, and that the flattened shape of the bone is the result of the final deformation, which had already taken place when the patient was examined the first time. As a matter of fact, if the affection belongs to the same category of disorders as the Calvé-Perthes disease, it is, indeed, quite possible that it may have been in existence, without presenting any symptoms, for some time before it was first skiagraphed; and to the speaker it seems that the shape of the vertebra may very well be compared to the flattened forms of the caput femoris which one often finds resulting from a Calvé-Perthes disease, and which, owing to the strong deformation, give rise to serious discomfort under any strain or exertion, precisely as in the case here described.

2. S. A. HEYERDAHL, Oslo: I have had occasion to roentgen-examine a case similar to the one described by Dr. PANNER, but I have only observed the patient for one year. In that case of mine there was found a flattened, disc-shaped vertebra, with normal intervertebral spaces between that and the nearest ones above and below. The patient was a boy eight years old; he was sent to be roentgen-examined on a suspicion of spondylitis. I was immediately aware that the case was *not* one of spondylitis; and I ended by concluding that it was probably some disorder of the spinal column, similar in its character to Koehler's disease of the os naviculare. I saw the patient again one year after. The pathological picture was unchanged, and the boy was well. As, in Dr. PANNER's case, there seems to have been a continued development of the disease for the worse, and even with formation of a slight gibbus, I shall try to go on following this case of mine also, and I may be able, at some future occasion, to report on its further development.

3. H. J. PANNER: As I stated in my paper, I hold it for very difficult to say, in a case of vertebra plana, when actual healing has taken place, seeing that my own patient was still a sufferer nine years after the disease

first declared itself; and, at the same time, I expressly pointed out that the rudimentary body of the diseased vertebra continued to look more or less the same through all those years. I, therefore, cannot agree with Dr. FLEMMING MØLLER, when he likens this vertebra to a caput femoris in a case of Calvé-Perthes disease that has finished its course. On the contrary, in the latter disease there is just the fact that the caput resumes the appearance of its normal osseous structure, and does not continue to show the characteristic opacities side by side with the rarefactions.

To Dr. HEYERDAHL I wish to say that it is true that this vertebral affection resembles Koehler's disease; but, at the same time, there are also differences in their respective pictures, both clinical and roentgenological. In Koehler's disease there is always, as far as I know, complete restitution — in contrast to what is the case in vertebra plana; and, besides, the roentgen pictures present that difference that in vertebra plana there always appears to be a diminution of the whole space between the two vertebrae that are neighbours, one on each side, to the diseased one; while in Koehler's disease there is always the same — normal — distance between the caput tali and the cuneiform bones, both on the diseased and the healthy side.

XXIII. H. J. Panner, Copenhagen: An Affection of the Capitulum Humeri Resembling Calvé-Perthes' Disease of the Hip[1]

The author reports two cases of elbow-joint affections, precisely similar both clinically and roentgenologically. The origin, in both cases, was immediately related to a definite trauma. In neither case did the affection cause more than a relatively slight inconvenience to the patient in the form of restricted mobility; there were hardly any pains, but some swelling at the joint. Both subjects were boys between the ages of nine and eleven years; their cases have been under observation for 4 and 16 months, respectively; the clinical healing is nearly complete; at the same time, none of them is yet fully restored.

Both cases have been skiagraphed from time to time. The most characteristic find has been a curious flossiness and diminution of the osseous centre of the capitulum humeri, together with structural changes in the latter. In both cases there has been a gradual return to normal conditions, though not fully attained as yet. In one of the cases there was noticed a slight periostal thickening of the upper end of the radius, and also the development of a shadow — as of what might be a corpus liberum — in front of the lower part of the humerus.

The conditions described have greatly resembled those which are commonly observed in cases of Calvé-Perthes' hip disease and in the epiphyseal disease of the second metatarsal, but have been totally unlike any other forms of either arthritis or osteitis. In the literature, only one similar case seems to have been described before — by ISELIN, but without any skiagraphs to illustrate it.

[1] To be published in extenso in a coming no. of the *Acta Radiologica*.

Discussion:

CARL KREBS, Aarhus: I can supplement Dr. PANNER's interesting communication by reporting an exactly similar case, which came under my observation in the month of March, this year. It was that of a boy, eight years old, and there had been a somewhat dubious trauma about two years ago. For the last six months he had complained of pains in the elbow, especially when writing.

The boy had been sent to the Radium Station to be treated for an angioma of the forehead, and it was in the course of that treatment that the matter of the pains in the elbow incidentallv came out.

Objective examination showed nothing in the way of muscular atrophy, but a certain restriction of the mobility, which lacked about 15° in full flexion, and about the same in extension. Wassermann was negative. Pirquet, after 24 hours negative, after 48 hours slightly positive. Roentgen examination showed normal conditions of the lungs; nor was there anything else abnormal to be observed in any respect.

The skiagraph of the right elbow showed the epiphysis in the capitulum humeri to be of the same size as on the unaffected side, but the structure of the epiphysis itself was irregularly blotched, and the whole picture resembled exactly that of the hip disease described by PERTHES and CALVÉ. (See Fig. 1 and 2 Tab. LIV). I beg leave to suggest the adoption, for this particular affection ot the elbow, of the designation: Morbus PANNERII.

XXIV. P. G. K. Bentzon, Copenhagen: Roentgenological Investigations Concerning the Arterial Supply of the Epiphyses

In connection with some studies concerning the pathogenesis of »local malacias» — published in the *Acta Radiologica*, vol. VI — the author had made a number of stereo-radiographs of bones, especially infantile bones, into which a heavy fluid had been injected in such a manner as to show the direction taken by the arteries of the epiphyses. He now demonstrates part of those stereographs, most of which represent anatomical material, obtained from amputations, into which the fluid — a gelatin solution containing either cinnabar or red lead — has been injected immediately after the operation. His investigations have resulted in the conclusion that in those epiphyses which experience shows us as being most frequently subject to some local malacia the distribution of the arterial supply is such as to make a traumatic lesion of the arteries highly possible, while in others, in which we never find those affections — such as the lower fibular epiphysis, for instance — the distribution is such as to provide a better protection for the arteries, against possible lesions. What specially characterises the condition, as regards several of the epiphyses which may be said to be »chosen spots» for such lesions, is the fact that the arteries to the epiphyseal nucleus must pass through, or along, the epiphyseal cartilage first.

Fig. 1.

Fig. 2.

At the meeting of the Orthopedic Congress at Gothenburg, a few days ago, no less than three separate speakers reported cases of pathological changes precisely similar to those malacias, but in a localisation never observed before — namely, to the medial part of the proximal epiphysis of the tibia. The speaker had never given any special attention to that particular region; but now, on examining his specimens of that epiphysis a little more closely, he finds that it is precisely one of those in which there is a rather large artery passing through the epiphyseal cartilage. His conclusions, then, are as follows:

1) Continued investigations confirm the theory that disturbances to the circulation are to a great extent responsible for the occurrence of those affections.

2) The theory according to which the pathological substratum should be a necrosis of the epiphyseal centre is difficult to reconcile with a great many of the clinically and pathoanatomically demonstrable phenomena.

3) The changes observed in the osseous tissue, in these affections, must probably rather be interpreted as a regenerative process analogous to the formation of a callus.

4) The occurrence of this reaction may be influenced by the existence of numerous predisposing conditions either constitutional — such as endocrine anomalies, or more local — such as inflammations, to such an extent that, clinically, those conditions may present themselves as being, indeed, the causative factors in the case; but the true, in the last resort determining factor is, after all, the lesion to the artery.

5) From the radio-clinical observations, compared with the results of anatomical studies and experiments on animals, it lies nearest to conclude that the lesion to the wall of the artery does not result in the closing of the vessel, but in an interruption of the vasomotoric nerves in the adventitia, with a consequent condition of arterial hyperemia; and that it is conditions connected with this arterial hyperemia of the osseous tissues that cause the reaction to set in.

Discussion:

1. H. J. Panner, Copenhagen: There can hardly be any doubt but that Dr. Bentzon is right when he points to peculiarities of the vascular distribution as the reason why many of these affections are localised precisely to those sites where we generally find them. Whether he is right in his other conclusions, concerning the origin of them, is something which I shall not venture to discuss; it is, indeed, quite probable. What I believe is wrong, however, is merely, in this respect, to bundle all these affections together and look at them in one single light. For instance, I firmly believe that the so-called osteochondritis of the capitulum humeri is essentially different from Calvé-Perthes' hip disease, from Koehler's disease and others, from which it stands apart entirely, both pathoanatomically and as regards its roentgenological characteristics.

2. P. G. K. Bentzon: I quite agree with Dr. Panner that several of the affections of which I have spoken here under the general term: »local malaciæ» are, in the character of their appearance, so different that it may seem unjustified to take them up and deal with them all under one group. Still, I

believe that as long as we know so little about the exact nature of those affections as we really do, so long must it be permissible for us to attack the problem over a rather large front; and so long do I suppose, therefore, that it may be justified to deal with the whole group as one unit, provided we bear in mind that our continued research will undoubtedly lead to the establishment of greater differentiations. As regards my »hyperemia theory», I am not at all surprised that it should meet opposition; for it certainly does seem both construed and complicated, compared with the simple »necrosis theory» adhered to and defended by authorities so much greater than myself. Yet, the more I work with those problems, the less can I find any reasonable explanation as to *how* such a local necrosis could possibly occur under the given circumstances. On the other hand, by accepting the lesion to the vasomotoric circulation as the determining, causative factor so many things about the pathogenesis and the whole course of the disease become immediately so clear that — even if I did not have the positive results of my experiments to back me — I should nevertheless feel justified in working on as I do, and in trying to make others interested in my theory.

XXV. P. Flemming Møller, Copenhagen: A Case of Koehler's Disease in the Navicular Bone of the Foot, Followed from its Earliest Stage until Complete Restitution

In the category of »juvenile-growth diseases» which comprises, for instance, Calvé-Perthes' disease, Osgood-Schlatter's disease, the disease of the apex patellæ described by SINDING-LARSEN, the epiphyseal affection of the posterior centre of the calcaneus, Koehler's disease of the 2nd metatarsal, and others, we generally also place the disease of the navicular bone of the foot which has likewise been described by Koehler. The justification for so doing has been challenged, however, from time to time, by several authors; and last winter, in the course of a debate in the Medical Society of Copenhagen, this doubt was voiced anew, and it was pointed out, among other things, that there had never yet been published a single case of Koehler's disease — of the navicular bone of the foot — which had been followed from its very earliest beginning until complete and final restitution; or — in other words — that there had never been observed a case of the disease developing in a formerly and up to that time normal navicular bone.

As far as I am aware, this is perfectly true. Indeed, already at an early period of my work, while I was making a study of Calvé Perthes' disease, my attention was caught by the fact, and I kept on the lookout for a case of the kind, because it would be vastly interesting if, by any chance, it should be possible to demonstrate precisely the same phases in the development of the disease in that other locality as in the hip. In 1918, then, I succeeded in finding a case, in which the difference between the navicular bones of the two feet was so small that it was a matter of doubt whether there was really anything abnormal, but where I nevertheless, on the basis

Fig. 1.

Fig. 2.

Fig. 3.

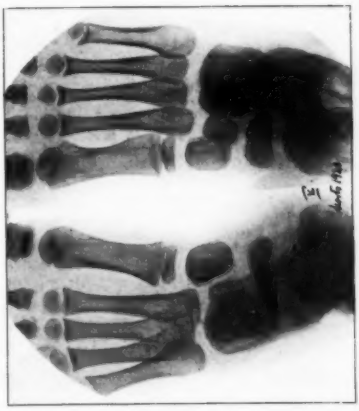


Fig. 4.

Fig. 5.

of a slight flattening of the left navicular bone, felt myself justified in diagnosticating the case as one of Koehler's disease.

I followed that case for two years — during the first year with examinations nearly every month, afterwards at longer intervals; and, as a result, I obtained a series of radiographs — from the earliest beginning until complete restitution — in which it is possible to observe most beautifully the very same stages in the development which we know so well from Calvé-Perthes' disease. Even the deformation stands out distinctly, here; and that is precisely one of the points on which the doubt has always hinged, as regards the identity of the two diseases; because it has continually been asserted that in Koehler's disease there was no deformation. The error of that assertion you shall now see plainly from my pictures, where you will notice — in the last ones of the series — both a hypertrophy and a flattening of the bone, in precisely the same manner as in Calvé-Perthes' disease and the other disorders belonging to the same group. That this deformation hasn't been noticed before is probably due to the simple fact that no case has hitherto been attentively followed for a sufficiently long time.

1) You see here the first picture, taken in May, 1918. There is just the slightest flattening of the bone (Fig. 1 Tab. LV).

2) Radiographed in July, same year. There is now a beginning disintegration of the bone, and you notice the progressive flattening and the diminution of the centre.

3) Radiographed in August, same year. Shows the same features still more markedly developed (Fig. 2).

4) Radiographed in September, same year. Hardly any change in the picture.

5) Radiographed in October, same year. There is already an incipient formation of new bone, which in

6) — radiographed in November, same year (Fig. 3) — is seen still further progressed.

7) Radiographed in March, 1919. Here we are again able to follow the whole outline of the bone; and we notice that already here it is a little broader than the corresponding one on the right foot (Fig. 4).

8) Radiographed in July, same year. Does not show very much change; but in

9) — radiographed in November, same year — the bone is distinctly seen to be noticeably broader than the one on the other foot; and in the last picture:

10) — radiographed in March, 1920 — in which the healing process must be said to be entirely completed, the increased breadth and the flattening of the bone present a striking likeness to the deformation which we find as the final result when a case of Calvé-Perthes' disease has completed its course (Fig. 5).

I shall not enter into any further comments on the disease; but after the pictures which I have had the pleasure of laying before you I believe it will be impossible to deny that the process which reflects itself here, in the navicular bone in Koehler's disease, and the one we observe in the hip, in Calvé-Perthes' disease, must be precisely and identically the same.

Discussion:

1. H. J. PANNER, Copenhagen, agrees with Dr. FLEMMING MØLLER that in cases of this kind one should not rest satisfied with a single roentgen examination. It will undoubtedly require a repeated examination, after a certain lapse of time, in order to establish a true and precise diagnosis. The speaker has himself had a case which, clinically, exactly resembled the characteristic affection of the head of the 2nd metacarpal, but in which it was impossible to demonstrate any abnormalities at the first examination, while subsequent examinations confirmed the diagnosis beyond any doubt.

2. P. G. K. BENTZON, Copenhagen: In connection with the remarks just made by Dr. PANNER I wish to say that I, too, have treated cases — subsequently fully proved as Calvé-Perthes — in which the clinical symptoms of that disease were so markedly present that I was able to diagnose them correctly long before the typical roentgenological changes began in the epiphysis. In such cases I have instituted the treatment right from the beginning — on suspicion — with immobilisation in plaster of Paris and, later, inward-rotation-, abductory night bandage. I have not, by those means, been able to prevent the roentgenologically demonstrable pathological changes from occurring in their due time; but the course of the disease has been benign, and especially in one case of this kind, which I have followed right through to its complete healing, the final result was a caput of which the deformation was unusually slight.

XXVI. Erik De Fine Licht, Vejle: Some Lights on the Clinical Value of the Roentgen Diagnosis in Reference to Tumors of the Hypophysis Cerebri

Diagnostication in cases of hypophysis cerebri tumors rests on the works of ERDHEIM and SCHUELLER. It is their division of them — into intrasellar and suprasellar tumors — that still forms the basis for the roentgen diagnosis in cases of this kind. It is not possible, however, from the roentgen picture alone to conclude anything definite with regard to the possibly existing tumor. Only those adenomata which cause acromegaly will produce changes so characteristic that, in many cases, it will be possible to diagnosticate them by the roentgen picture alone. The changes consist in a characteristic dilatation of the sella, in connection with acromegalous changes in the bones of the latter.

The speaker here demonstrates a number of cases characterised by acromegaly.

To prove the importance of a close comparison between the clinical observations and the roentgenological picture, the speaker further demonstrates a number of cases in which there exist roentgenologically demonstrable changes of the sella, and where autopsy has been made. They show that changes precisely similar to those observed in the case of ordinary intrasellar

adenomata can be caused by tumors of the auditory meatus as well, and also that a malign tumor not hypophyseal can cause hypertrophy of the hypophysis with attendant dilatation of the sella, while the hypophysis remains microscopically normal. Finally, a tumor of the cortex, even situated some distance away, will produce the same picture as found in the case of a suprasellar tumor.

Next, the speaker demonstrates a series of pictures in which the clinical diagnosis is probably fairly certain, but where no autopsy has taken place. He thinks it is possible to show, by means of these, that precisely identical changes may, at any stage, be produced either by tumors of the suprasellar passages of the hypophysis or by basal tumors that have nothing whatsoever to do with the hypophysis.

Diagnostically, the roentgen picture is of value only in intimate connection with the clinic, except in certain cases of acromegaly; and in most of those the clinical diagnosis will generally be possible without the aid of roentgen examination. Extensive sellar destructions or — provided the radiographs are faultless — vague and woolly outlines will be indications of malignity. The woolly outlines — which one does not see in cases of wear from pressure — are probably the result of growing infiltration in the bone tissue.

The question of malignity can not be settled on the basis of the roentgen examination; but the roentgen picture will always be an important aid for judging the possibilities of an operative intervention.

The material for the speaker's demonstrations was obtained from the Rigshospital at Copenhagen.

XXVII. H. Haxthausen, Copenhagen: Five Years' Experience with »Blue Light» as Local Treatment in Lupus Vulgaris

By using the method — described in an earlier paper — for intensifying the Finsen treatment with concentrated carbon-arc light (fourfold intensification of the light, using at the same time a filter of »Blau-Uviol-Glas» in order partly to absorb the luminous heat rays) the speaker has, during the five years since his first experiments, obtained the following results:

With old cases, hitherto refractory to ordinary Finsen treatment combined with light-baths: *20 cures out of a total material of 95.* Of the twenty cured, eight have been under observation, since, for more than two years.

With fresh cases, *of 24 treated, 22 cures.* Average time of treatment: 4.1 months, including pauses. Also the two remaining cases were to all appearances cured; but both of them later on recurred — each with a single small nodule in the cicatrix. Still, a definite cure may confidently be looked for, also in those two cases. Of the twenty-two others, eight have been under observation, since, for more than two years.

XXVIII. Hugo Laurell, Uppsala: On Respiratory Changes in the Lung Picture, Mediastinum and Diaphragm, under Normal Conditions and under Certain Pathological Conditions in the Lung and Pleural Cavity[1]

Discussion:

1. V. MALMSTRÖM, Falun: I should like to ask Dr. LAURELL how it goes with the displacement of the diaphragm, described by him, in the case of a *spontaneous* pneumothorax where there is free communication between the pneumothorax passage and the bronchial system. We know, of course, that in such a case the opening of the pneumothorax widens during inspiration, and there is a displacement of the mediastinum toward the side of the lung that is not collapsed. This means that in the case of an open, spontaneous pneumothorax this displacement of the mediastinum takes place in a sense opposite to what is the case when the pneumothorax is a closed one.

If the diaphragm here functions in the same manner as it does in the case of the closed pneumothorax, then its displacement must, in the case of the open pneumothorax, *counteract* the movement of the mediastinum in the same degree to which, with the closed pneumothorax, it *aids and contributes* to that movement. But, at the same time, we know sufficiently well that in the case of the open pneumothorax the movement of the mediastinum can be a matter of some importance, and can have a very unfavorable influence on the breathing. It would be interesting, I am sure, to hear Dr. LAURELL's opinion on this matter.

2. PJETUR BOGASON, Sölleröd: I have been very interested in Dr. LAURELL's account of his investigations concerning the movements of the mediastinum. In 1918, I had occasion to examine a young, perfectly healthy girl who ten years before that time, in 1908, had had some slight trouble with her *left* lung; and I found, on screening her, that the median shadow had a movement of 2.5 cm. toward the *left*. There was no pneumothorax. I have since examined tuberculous patients with reference to this symptom, and have found paradoxal movements of the median shadow in 87 cases, or about 20 per cent. of all those examined. Most of those eighty-seven were old cases, chiefly unilateral, with caverns and a more or less shrunk condition of the lung on the side where the symptom was found. The movements of the diaphragm were the same on both sides in 32 cases; in the others they were a little less on the affected side. I am inclined to believe that, in the case of those tuberculous individuals, the symptom must be accounted for by the shrunk condition of the lung, which, owing to its rigidity, is unable to fill out the larger space in the thorax when the latter is expanded by inspiration. As a result, the median shadow will be drawn over farther toward the side where the shrinking is. The forces which cause the volume of the thorax to increase are, of course, partly the costal muscles, partly the diaphragm. In several of the normal cases I have noticed that the median shadow became broader

[1] Published in extenso in this no. of the *Acta Radiologica*.

during the beginning of the inspiratory movement, and then gradually stretched and became narrower toward the end of the inspiration; and I have interpreted this as indicating that the contraction of the diapraghm ceased later than that of the costal muscles. I could imagine that this might possibly furnish an explanation for Dr. LAURELL's »third type».

3. H. DAHLSTEDT, Österåsen: The paper read by Dr. LAURELL has, to us sanatorium-physicians, been a most interesting and valuable lesson concerning conditions and problems which we constantly encounter in our work there.

That the mediastinum, in pulmonary tuberculosis, not infrequently shows considerable to-and-fro movements is something which I have observed myself. Dr. LAURELL speaks of such movements in connection with certain pathological conditions: pneumothorax, pleuresy, bronchostenosis; and of the pseudo-movements that under normal as well as pathological conditions can result from an uneven filling of the various parts of the heart; but also in severe cases of — especially unilateral — pulmonary tuberculosis have I been able to observe considerable to-and-fro movements, particularly in such cases as were marked by cavernous changes. I look at it in the way that there exists in the thorax, normally, a state of equal balance between the two halves, conditioned on a variety of factors of various kinds. It is when some pathological change or other — as, for instance, in the lung — causes a disturbance of that equilibrium, that the conditions arise for the mediastinal movement to come into play. Of course, the movement does not always occur. There may be features about the mediastinum itself, for instance, which prevent it from so doing. It seems to me that in cases of pulmonary tuberculosis without pleural complications those mediastinal to-and-fro movements are especially noticed when there are any destructive changes in the lung causing degeneration of the elastic tissues of the latter. In cases of simply exudative changes, without degeneration, I do not think I have observed them to anywhere the same extent.

4. G. FORSSELL, Stockholm: Dr. LAURELL's interesting paper marks an important step forward, as regards the roentgen anatomy and physiology of the lungs. As in the other fields of roentgen diagnosis, so in the matter of the lungs does the knowledge of the anatomical correspondency of the roentgen pictures form the very basis of that diagnosis. I shall have time only for a few short observations concerning a couple of technical and anatomical questions. In our discussions here — just as it is currently the case in roentgenological literature also — the term: »hilum shadow» has been used in a variety of distinctly different meanings; namely, partly to designate the radiographic picture of the anatomical formations normally occurring in the hilum; partly to designate pathological densifications within the hilum; and finally, to indicate all and any sort of shadow-giving formations at the point where the hilum ought to be.

If, however, we are to develop to greater accuracy the roentgen diagnosis also in the matter of the lungs, it is absolutely necessary that we should, as far as possible, connect back each detail of the roentgen picture to some definite anatomical term or feature, both as regards normal and pathological structures. Thanks, especially, to the method of long-distance, short-time exposures, our radiographic technique is now so far advanced that we are justified in regarding as a failure any picture of the lung in which the struc-

tural details of that organ do not stand sharply outlined — especially the pulmonary vessels and the coarser bronchi, except, of course, where they may be covered by pathological formations.

Both in order to justify the demands on our technique and — most of all — to ensure a description of the radiological findings in keeping with the clinical and pathoanatomical terms and manner of dealing with the subject we must strive, in accounting for our observations, to preserve some contact with the anatomical foundation by employing the current anatomical nomenclature.

In making a detailed study of the changes in the hilum pulmonis it is often in a really good radiograph possible not only to discern the pulmonary artery and veins, as well as the — negative — picture of the coarser bronchi, but to observe even the typical shape and structure of pathological formations that to a greater or lesser extent mask the normal organs in the hilum. In formulating one's roentgenological verdict on the case one must, therefore, strictly distinguish, in the pictures of the hilar region, between the »hilum shadow» in the anatomical sense and such shadows in the hilum as may be the result of pathological changes there — the structure and topography of which should then likewise be described in due course later.

A similar anatomical analysis should be extended to comprise every part of the lungs; and the time will undoubtedly come when that organ shall have been radioanatomically mapped out in all its minutest details.

Dr. LAURELL gave us, in his paper, some interesting observations concerning the various manner in which the vessels are filled under different conditions of posture and breathing. Let me, in that connection, point out how useful it often is, in such cases of pulmonary changes as are accompanied by an increased afflux to the vessels of the lungs, to examine those organs both with the patient standing up and lying down. Not infrequently bronchopneumonic, pneumonic, and peripneumonic condensations appear more solid — and even, more extensive — when the body is in a horizontal position than when upright; probably because, in the former case, there is an increased congestion of blood. It is even possible, by such double examination, to form more or less of an opinion as to how great a part the local congestion plays in the condensation.

In this connection I also wish to call attention to the rôle which any pleural effusion into the bronchi, large or small, together with an eventually resulting, more or less local atelectasis, plays with regard to the appearance, in the radiograph, of opacities within the parenchyma of the lungs.

The injections with lipiodol have given us a material for comparison which enables us to judge the effect on the roentgen picture both of fluid effusions in the bronchi and of interstitial accumulations of inorganic matter.

It is probable that not a few of the »parenchymatous» opacities which sometimes disappear rather quickly — in roentgen pictures of tuberculosis, for instance — are due to accumulations of fluid, such as stagnated secretions or blood, in the lumina of the bronchi.

An anatomical and pathoanatomical analysis of the roentgen pictures, systematically carried through, will undoubtedly, with the steadily advancing technique, eventually lead to an ever more detailed and intricate roentgen diagnosis; but it will, at the same time, help to make the lung diagnosis increasingly perfect and sure, and will open up still greater possibilities for a useful scientific revision of the roentgenological material.

XXIX. P. Flemming Møller, Copenhagen: The Radiographic Picture in Chalicosis, and its Differential Diagnosis from Other Affections of the Lungs[1]

The author describes the radiological changes in chalicotic lungs — »porcelain workers' lungs» — and points out that the changes, from the moment the condition has reached a certain stage of development, are of a kind and character which will always make it possible to make the correct diagnosis, provided one possesses a flawless radiograph of the case. At the same time, he shows — by juxtaposing radiographs of chalicotic lungs to pictures representing certain forms of tuberculosis and other pathological lung conditions, notably lymphogenous carcinomatosis and syphilis of the lungs — that the differential diagnosis from those other conditions *can* be difficult; he points out what changes are characteristic of one or another of those conditions; and he lays stress on the important rôle of the clinical findings and the anamnesis as aids to a correct interpretation of such cases.

Discussion:

1. L. Edling, Lund: As it is probably well known — and as Dr. Flemming Møller also points out in his paper — there exists, in so far as the resulting pneumoconiosis is concerned, a fundamental difference in the character of the various foreign substances that are inhaled into the lungs. In chalicosis, silicosis, etc., it is really *one single element*, common to all of the different substances responsible for those diseases, viz. silicic acid — SiO_2 — which injures the lungs and causes the serious pathological changes in them. The same is the case with anthracosis; namely where it is a question of professional work in coal mines where the coal lies imbedded in layers of rock of one description or another.

With all those professional workers, the quantity of the foreign substance accumulated in the lungs will depend on the proportion between the quantities inhaled and the power of the lungs to get rid of it again. Tendeloo, basing himself on the experimental investigations of Arnold, has shown that in the course of this process the greater part of the dust becomes accumulated in the *nether* part of the lungs, and is gotten rid of again in two ways. A great deal passes out, as a sort of deposit with the sputum, from the finer air-passages, and is expelled further by the aid of the ciliary epithelium of the coarser bronchi; another part is absorbed into phagocytes that either become eliminated somewhere in the lymphatics or else are gradually carried along, through the lymphatic vessels, from the nether part of the lungs to the upper, subapical parts of the latter. In radiographs of cases where there has been a chronic inhalation of foreign dust particles it is, therefore, in those upper parts of the lungs that we observe the changes I have just mentioned; especially where it is a question of dusts whose specific gravity is compara-

[1] Published in extenso in the *Acta Radiologica*, vol. VIII, pp. 193 ff.

tively low. It is in those upper parts of the lungs, then, that the silicic dust chiefly produces its injurious effect, resulting not only in a mechanical clogging of the lymphatic vessels, but also in a chronic, inflammatory condition which eventually leads to the formation of connective tissue and to obliteration of the walls of those lymph passages. In cases where the specific gravity of the dust is relatively high — as with the porcelain dust in chalicosis, for instance — the displacement upward probably takes place less easily; and this probably explains to a certain extent the more diffuse character of the changes such as we see them in several of Dr. FLEMMING MØLLER's pictures.

Entirely different is the case when we come to such forms of anthracosis as the ones with which I have dealt in my monograph on the pathological changes observed in the lungs of the Höganäs coal miners. There, the coal is, namely, found in a state almost absolutely pure, chemically; and it causes not the slightest inflammatory irritation of the lung tissues, but only mere disturbances of the circulation, stasis, edema and atelectasis. I wish to lay particular stress on this; and I wish to ask Dr. FLEMMING MØLLER whether he has made any microscopical examination of his cases, and, if so, whether he has found any considerable atelectatic changes. The latter, in pneumoconiosis, probably play a larger rôle than we have hitherto been aware.

Finally, as regards the differential diagnosis of pneumoconiosis from tuberculosis, I have dealt with that question — in the monograph to which I just alluded — with special reference to the second stage of the anthracosis. I said there that this second stage differed from miliary tuberculosis by the fact, among others, that in the latter disease the apices of the lungs are just as filled with tuberculous foci as the other parts, while in anthracosis they are generally free. This would seem to be the case in chalicosis also; inasmuch as Dr. FLEMMING MØLLER says, in regard to the *third stage* of that disease, that condensations often occur even in the apices. Now, inasmuch as we know that in chalicosis — as well as in other forms of silicosis — the disease very often is complicated with a chronic tuberculosis, I should like to ask Dr. FLEMMING MØLLER whether he has examined such cases of changes in the apices for tubercle bacteria. In one of my own cases I have been able, on the basis of the roentgen picture alone, to establish the diagnosis of such a complication with tuberculosis; and there also it was precisely in the right apex that the change existed.

(The speaker illustrated his remarks by means of a number of radiographs from his collection.)

2. S. A. HEYERDAHL, Oslo: In cases of miliary tuberculosis and of tumor metastases in the lungs there is not infrequently a considerable discrepancy between the clinical and roentgenological findings.

As the roentgenological demonstration of tumor metastases in the lung may be of decisive importance with reference to the question of a primary tumor's operability, I believe that the two radiographs which I shall now first show you will be of interest, when regarded in connection with the clinical findings.

I. — The first radiograph which I show you is from a woman, 72 years old, with a cancer mammæ.

Since the summer of 1926 she had been conscious of a pain underneath the nipple of the right mamma. The pain did not increase; but six weeks be-

fore Christmas she felt in the breast a lump, or nodosity, which grew larger, though without being painful. From time to time there has come some blood from the right nipple. During the last couple of months she has had some inarticulate pains in the upper part of the back: quite recently she has begun to lose flesh.

On January 10th, this year, she was admitted into our Surgical Dep't B. — At the time of admission her face was of a pale yellowish color. In the lower part of the right mamma there was a tumor as large as an apple, and several smaller ones here and there in the mammary tissue. Numerous blueish-violet nodules in the skin around the mamma. In the right axilla there could be felt a bunch of glands, about as large as a walnut, hard and insensible to the touch. About the lungs there was nothing particular to remark. — *January 21st:* For the last few days the patient has complained of pains in the back. A radiograph of the columna vertebralis was requested.

The radiograph, which was taken the same day, showed nothing abnormal as regards the spinal column; but over both pulmonary fields there were numerous roundish shadows, some of them as large as a nut. — Roentgen diagnosis: cancer metastases in both lungs.

On *January 25th*, entry in the journal as follows: Percussion sounds over posterior surface of both lungs perhaps a little short; on auscultation, vesicular respiration everywhere; no foreign sounds.

January 27th: During yesterday, weak and hazy, with quick respiration. Died this night.

January 28th: Autopsy. — *Lungs*: The surface of both lungs is slightly lumpy, owing to the presence of greyish-white nodosities, of a cartilaginous hardness, in the lung tissue. Between the infiltrations, which are scattered over both lungs, the lungs themselves feel full of air, slightly hyperemic and edematous. In either hilum are numerous greyish-white glandulæ, some of them as large as a nut. Also in the parietal pleura there are numerous greyish-white nodules, especially in the inferior and posterior parts, and in the diaphragm. — Besides, there were metastases to the liver and the ribs.

II. — This radiograph is from a man, 33 years old, who had for a couple of months been suffering from increasing pains in the loin, radiating anteriorly into the abdomen. The pains had gradually become very severe, and on February 3rd 1927, he was admitted into the Rikshospitalet, Surgical Dep't B. He didn't complain of coughs, and the physical examination revealed nothing abnormal. When he was sent to the Roentgen Dep't to have a radiograph taken of his columna vertebralis the picture incidentally showed him to be suffering from tumor metastases in the lungs. The radiograph showed, spread over both lungs, numerous roundish shadows, ranging in size from a nut to a hen's egg. The shadows covered the greater part of both lungs.

The patient died about one month later. Autopsy was refused.

III. — A farmhand, 23 years old, was admitted into the Rikshospitalet, Dep't of Nervous Diseases, suffering from an increasing weakness of both legs, the first symptoms of which had been noticed two weeks previously. He had had an attack of pleurisy six months before.

At the time of admission, *February 4th*, 1921, his condition was as follows: Temperature, 38.3°. Paraparesis of both lower extremities; marked rigidity; paresis most pronounced on the left side. The sensibility was reduced, for all qualities, below the limit D8. Over the lungs, conditions normal.

February 8th: A radiograph was taken, which showed small spots of shadow, close to each other, all over both lungs, from apex to base. Enlarged hilum shadows. The roentgen picture points to miliary tuberculosis.

Still no abnormal indications from clinical examination of the lungs.

The patient lay with remittent fever without pulmonary symptoms until March 23rd, when he began to cough, with mucopurulent sputum. No tubercle bacilli could be found in the expectorated matter. The roentgen findings remained practically unchanged. He died *April 15th, 1927.* The autopsy showed miliary tuberculosis of lungs and liver; hemorrhagic myelitis.

Beside these three cases, the speaker showed a couple of other cases of miliary tuberculosis, in which the diagnosis was established roentgenologically before there were any manifest clinical symptoms.

XXX. S. Junghagen, Lund: Atelectasis as a Roentgen Symptom in Diseases of the Lungs [1]

XXXI. P. Flemming Møller, Copenhagen: On Congenital Thoracic Cysts and Lung Deformities in the Roentgen Picture[1]

The author communicates two cases of congenital cysts in the mediastinum, one of which was diagnosed through roentgen examination and cured by operation. In connection with the same he presents two cases of what are probably congenital, multiple pulmonary cysts — one probably developed in an accessory lung, the other probably a case of fetal bronchiectasis; both likewise diagnosed through roentgen examination.

[1] To be published in extenso in a coming no. of the *Acta Radiologica.*

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Ing. Andersen, S. K., Copenhagen
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» Schiander, A. W., Oslo

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Prof. Forssell, G., Stockholm
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» Werenskiold, B., Upsala

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Prof. Dr. Otto Naegeli, Schmelzbergstr. 40. Zürich.
Prof. Dr. Naegeli. Monbijoustr. Bern.
Dr. David v. Niederhäusern. Heiligenschwendi.
Dr. Eug. Nienhaus. Villa Fortuna. Davos-Platz.
Dr. Niquille. Av. de la Gare 36. Fribourg.
Dr. Ch. Perret, Clinique La Prairie. Clarens.
Dr. Henri Perrier. Rue St.-Léger 6. Genève.
Dr. Jules Perrier. Vevey.
Dr. C. Pettavel. Neuchâtel.
Dr. Paul Pfaehler. Olten.
Prof. Dr. Fr. de Quervain. Kirchenfeldstr. 60. Bern.
Dr. W. Raafflaub. Gurtengasse 6. Bern.
Dr. R. Ramser. Niederbipp.
Dr. Hans Reinhart. Stalden 77. Solothurn.
Dr. Rhonheimer. Gartenstr. 10. Zürich 2.
Dr. Ernst Rieben. Spitalarzt. Interlaken,
Dr. Fritz Ris. Spitalarzt. Saanen.
Prof. Dr. Rosselet. Av. Secretan. Lausanne.
Prof. Dr. Roux. Place Monbenon. Lausanne.
Dr. E. Ruppanner. Spitalarzt. Sämaden.
Dr. Fancino Rusca, P.-D. Locarno.
Dr. Ernst Rychner. Finkenhubelweg. Bern.
— Alex. Rzewuski, Röntgenologe. Eisenbahnstr. Davos-Pl.
Dr. Ch. Saloz, P.-D. Rue de la Pelouse 6. Genève.
Dr. H. Schaad. Herzogenbuchsee.
Dr. H. Schenk. Luisenstr. 41. Bern.
Prof. Dr. Schinz. Krautgartenstr 2. Zürich.
Dr. Alex. Schirmer. Waisenhausstr. St. Gallen.
Dr. Jakob Schmid. Leysin.
Dr. Willy Schnyder. Balsthal.
Dr. Rob. Schweizer,. Stadelhoferstr. 15. Zürich.
Dr. H. Siegrist. jun. Spitalarzt. Brugg.
Dr. Willi Spillmann. Zürich.
Dr. Steinegger. Lachen. Schwyz.
Dr. E. Stettler. Nyderklaube 9. Bern.
Dr. F. Stupnicki. Pestalozzistr. 4. Burgdorf.
Dr. Ad. Suter. Bahnhofstrasse 14. Zürich.
Dr. Herm. Suter. Bahnhofstrasse 22. Zürich.
Dr. Gustave Turini. Sierre.
Dr. S. Ulrich. Freie Strasse 190. Zürich.
Dr. A. Voegeli. Kreuzstr. 82. Zürich.
Dr. A. Vogel. Reussteg. Luzern.
Dr. Vuillet. Av. de la Gare 34. Lausanne.
Dr. Wagner. Wattwil.
Dr. Hans Walther. Schwesternhaus v. Rot. Kreuz. Zürich.
Dr. R. Weibel. Unter-Hallau. Schaffhausen.
Dr. R. Welti. Yverdon.
Dr. Max Winkler. Alpenstr 7. Luzern.
Dr. Wuhrmann. Kilchberg. Zürich.
Dr. Ed. Wyss. Wallgasse 8. Bern.
Dr. Armin Ziegler. Bankgasse 20. Winterthur.
Dr. R. Zollikofer, Chefarzt. Kantonspital. St. Gallen.